4.0 STATISTICAL ANALYSIS

This chapter provides statistical analyses of the City's contracting and purchasing activities including an examination of the City's market area, the utilization and availability of M/WBEs (Minority/Woman-Owned Business Enterprises), and disparity results. All analyses were conducted for three business categories (construction contracting, general services contracting, and purchasing of commodities). Also included is the methodology for the statistical analyses.

The analyses sought to determine the existence and, if applicable, the extent of disparity between the availability of minority- and women-owned businesses and the City's utilization of such businesses. The study included all construction, general services contracts, and purchases of commodities made between January 1, 1993, and December 31, 1997. The data MGT collected from the Engineering and Architectural Services Department and the Finance Department Materials Management Division included exhaustive information on all construction and procurement in each of the City's departments.

The following sections comprise the chapter:

- Methodology
- Construction
- General Services
- Commodities

4.1 Methodology

This section details the methodological procedures associated with:

- Business Categories
- M/WBE Classifications
- Data Collection
- Geographic Market Area
- Utilization Analysis
- Availability Analysis

- Determination of Disparity
- Significance of Proportions Test

The following subsections explain the methodology MGT used in its analyses.

4.1.1 Business Categories

MGT conducted M/WBE utilization, availability, and disparity analyses for three business categories: construction, general services, and commodities. The categories were defined by the types of purchases made and contracts awarded by the City departments during the study period. The study period included calendar years 1993 through 1997. MGT based the analysis of each business category on the service provided by the individual contract or purchase, regardless of which department or section procured the item.

Construction

All construction-related business including:

- Building Construction
- Heavy Construction (road construction, bridge construction)
- Specialty Trades Construction (carpentry, electrical, plumbing)
- Miscellaneous (major landscaping and horticultural services)

General Services

All services that are labor intensive and not a professional or construction service, including:

- Printing and Publishing Services
- Transportation Services
- Electric, Gas, and Sanitary Services
- Business Services
- Auto Repair Services
- Educational and Training Services
- Miscellaneous Repair Services

Procurement of Commodities

All equipment, consumable items purchased in bulk, services, or deliverable products including:

- Equipment and parts (vehicles, machinery, and furniture);
- Consumable commodities and supplies (office supplies, books, food, and uniforms).

4.1.2 M/WBE Classifications

For analytical purposes, MGT classified firms as either M/WBEs or non-M/WBEs. M/WBEs are those firms that are at least 51 percent owned and controlled by members of one of four groups—African American, Hispanic American, Asian/Native American, and non-minority women. The City created the nomenclature for this study. MGT conducted availability, utilization, and disparity analyses for M/WBEs and non-M/WBEs according to the following M/WBE and non-M/WBE classifications:

- **African American:** U.S. citizen or lawfully admitted permanent resident having an origin in any of the Black racial groups of Africa.
- **Hispanic American:** U.S. citizen or lawfully admitted permanent resident of Mexican, Cuban, Puerto Rican, Central or South American, or other Spanish or Portuguese culture or origin, regardless of race.
- **Asian/Native American:** U.S. citizen or lawfully admitted permanent resident originating from the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands; or a U.S. citizen or lawfully admitted permanent resident originating from any of the original peoples of North America, and who maintains cultural identification through tribal affiliation or community recognition.
- **Non-Minority Woman:** U.S. citizen or lawfully admitted permanent resident who is a non-Hispanic white woman.
- **Non-Minority Man:** U.S. citizen or lawfully admitted permanent resident who is a non-Hispanic white man.

Since minority women more closely identify with discrimination due to their race, rather than gender, minority women are included in their respective minority categories.

MGT used information it obtained from the City and Maricopa County to develop a database of M/WBE vendors and contractors differentiated by ethnicity. In addition, MGT used community resources for additional names of M/WBE firms. MGT also maintained a record of vendors who participated in personal interviews or the public hearings as part of the study, who identified themselves as M/WBE firms. From these sources, MGT compiled a master list of M/WBE vendors for use in subsequent utilization analyses. Among the sources of M/WBE information were the following:

- Arizona Asian-Pacific Yellow Pages
- Arizona Department of Commerce
- Arizona Department of Transportation
- Arizona Hispanic Chamber of Commerce
- City of Phoenix Finance Department
- City of Phoenix M/WBE Goals Compliance Unit
- City of Phoenix Economic Development Department
- City of Phoenix Engineering and Architectural Services Department
- City of Phoenix Equal Opportunity Department
- City of Tucson
- Grand Canyon Minority Supplier Development Council
- Maricopa County
- State of Arizona Registrar of Contractors

4.1.3 Data Collection

MGT assessed the City's data records to determine the type and format of data available. Based on that assessment, MGT designed a data collection plan outlined in the paragraphs below. The collection of data occurred during the month of August 1998. Each City department provided confirmation that all City construction contracting was

conducted through the Engineering and Architectural Services Department or the Finance Department's Materials Management Division; procurement of commodities and services was conducted through the Materials Management Division. Further, MGT received confirmation that payments for all procurement were made through the City's Finance Department.

During the review of database contents, MGT excluded the following records:

- Records of intergovernmental transactions with government agencies or non-profit organizations. These records indicated that competition was limited to government agencies or non-profit organizations.
- Records for which all information critical for analysis (vendor name, zip code, or date) could not be found. These records comprised less than 0.1 percent of the total dollar amount in the final database.
- Records with zero dollar amounts. These records indicated that the purchase requests were not fulfilled and the work was rebid.
- Reimbursements to employees for expenses incurred. Vendors used for employee expenses were not listed.
- Utilities such as water, gas, and electricity. These records were beyond the scope of the study. Public utilities are not part of a competitive bidding process.
- Mortgages, certificates of deposit, other banking transactions, salaries, refunds, petty cash, fringe benefits, and insurance payments. These records represent administrative transactions beyond the scope of the study.

Construction

The following section examines the data collection process for prime contracts and subcontracts in the construction category.

Prime Contracts

MGT received an electronic data file from the Engineering and Architectural Services Department containing a list of contracts approved by the City Council. The file contained only construction contracts with M/WBE goals awarded through the Engineering and Architectural Services Department from November 1993, through

December 1997. The database listed 475 of these contracts that were approved during the relevant study period. Included in the database were:

- Index Number
- Date
- Contract Status
- Prime Contractor
- Award Amount
- Proposed M/WBE Utilization Goals

After obtaining the data, MGT entered the construction contract information into a comprehensive database that included all elements of data essential to conduct the analyses. MGT also reviewed all bid award records to determine the total number of contracts awarded from January 1, 1993, though December 31, 1997, with and without goals. The total number of projects for which the City received bids was 641. MGT received an electronic payment database from the Finance Department for November 1993, through December 1997. Records from the 4,770 monthly progress payments were then classified as construction-related using National Institute of Government Purchasing (NIGP) codes. This list of NIGP codes were presented in Appendix C.

From the records reviewed and the electronic data provided, MGT assembled an exhaustive collection of data for analysis. Before the data were ready, all information was supplemented where necessary. Supplementing data involved supplying addresses for prime contractors and subcontractors where needed and identifying firms as either M/WBEs or non-M/WBEs according to their primary ownership. The determination of firms' addresses was important because market areas cannot be established unless the county in which the prime contractor is located is known.

MGT verified the database information and collected additional information on contracts awarded during the study period but not included in the electronic data. The information included prime contractor and subcontractor data such as:

- Name
- Address
- Type of Service Performed
- Award Amount

- Final Payment Amount

MGT reviewed 347 contracts and associated project files in the Central Records section of Engineering and Architectural Services and 294 contracts at the City Clerk's Records Management Division Records Center. Data collection staff reviewed each contract file and recorded the relevant information on data sheets. Information from the MGT data sheets were then entered into a database file to facilitate analysis. The database structure documented the following data elements:

- Index Number
- Date of Award
- Project Description
- Service Provided
- Final Dollar Amount
- Contractor
- Address
- City
- State
- Zip Code
- Contact Person
- M/WBE Status

Subcontracts

Contract files also contained information on subcontractors, generally as prime contractor lists of subcontractors and 20-day lien notices. The collection team recorded the subcontractor data on worksheets for subsequent entry into databases. The subcontractor data included:

- Subcontractor
- Address
- City
- State
- Zip Code
- Service Provided
- Award Amount
- M/WBE Status

MGT determined the M/WBE status of the remaining subcontractors by comparing subcontractor names with M/WBE lists maintained by the City, Maricopa County, the Arizona Department of Transportation, and the City's EOD database of vendor eligibility

status with the City. If the databases conflicted regarding the race or gender of a firm, MGT contacted the firm directly to ascertain the correct classification. In addition to matching subcontracting firms with their ethnicity, firms' proper names were established to ensure a consistent format for analysis.

MGT designed a verification survey to corroborate subcontractor information collected from contract files. Survey forms and a cover letter were sent to prime contractors requesting that they verify subcontractors utilized, owner ethnicity and gender classification (if any), and the subcontractor dollar amounts. The cover letter also stated that if the prime contractor did not respond, MGT would conclude that subcontractor information on the verification report was correct. If the subcontractors had a dollar amount of zero, according to the City's contract files, these subcontractors were included in the verification process.

Of the 200 surveys distributed, 61 (31 percent) were completed and returned by the recipients, while 29 (15 percent) ultimately could not be delivered because of incorrect addresses. For the 110 surveys mailed that were not returned, MGT attempted to call the prime contractors to request that a completed survey be mailed or faxed to MGT. Seven prime contractors faxed the verification reports with no changes and eight others sent reports with corrections. Of the 76 prime contractors who ultimately responded to the survey, 39 made changes in the subcontractor information either by adding additional subcontractors, altering the dollar award amounts of subcontracts, or altering the M/WBE classification. The survey responses included multiple projects for the primes.

MGT received an acceptable response from the verification survey to reliably measure the validity of the City's subcontracting records. The survey responses demonstrated that primes found the subcontracting data to be accurate.

The database reflected the changes indicated by the prime contractors, except for some discrepancies on M/WBE status of subcontractors. The database did not include changes to some subcontractors' M/WBE status because none of the other data sources could corroborate the changes indicated by the prime.

Appendix A contains a complete listing of all construction contracts. Contracts are arranged in chronological order, from most recent to oldest. Following the list of prime contracts, Appendix A also includes a list of subcontracts with subcontractor ethnicity, arranged in fiscal year order. All contracts are included in these listings whether the prime contractor was located within or outside the relevant market area. Note that all contract data listed in the appendices are not included in utilization since the utilization analysis is based only on contracts in the relevant market area.

General Services and Commodities

MGT received a database from the Finance Department containing City purchasing records from January 1, 1994, through December 31, 1997. For 1993 purchasing information, MGT reviewed records at the City Clerk's Records Management Division Records Center and recorded the data on data collection forms. MGT separated the database into two tables, one for service payments and one for commodity purchases. The NIGP codes indicated whether each purchase was a commodity or service. A list of NIGP codes and classifications are presented in Appendix D. After payments were separated into two business categories, the data collected at the Records Center was added to the electronic data provided by the City.

Payments were sorted by NIGP code and subject. Of the 597,423 records in the original database, 43,804 were purchases deemed beyond the scope of the study and consequently, were removed from the tables used for analysis.

Items eliminated from the database included:

- Payments to charities and nonprofit organizations;
- Payments to government entities;
- Utility and telephone service payments;
- Building mortgages or rent payments;
- Land leases or purchase payments;
- Conference fees; and
- Parking fees.

These items were not purchased competitively. Additionally, payments to employees for reimbursements and checks made out to petty cash were not collected or analyzed because vendor data is not available for these items. Finally, banking transactions, insurance payments, refund checks, salary payments, and garnishments were not collected because they are administrative items rather than purchases. MGT used object codes assigned to purchases by the City to define the purchase type, determine the business category, and determine which purchases were within the scope of the study. These purchases were then analyzed to determine utilization.

MGT collected a sample of general services payment data for the five-year study period in order to verify the electronic data. The total number of payments for each year was determined and a sufficient sample was taken to establish at least a 95 percent confidence level.

NIGP codes were used to determine service descriptions. Refer to Appendix D for a complete listing of the NIGP codes and services for each category.

4.1.4 Geographic Market Area

Consistent with legally accepted disparity study methodology, MGT grouped contracts into categories according to the prime contractors' geographical location. Once contracts were classified into geographical categories, MGT could determine where the City conducted its business for construction-related projects. MGT selected the county as the geographical unit of analysis based on the following:

- courts have accepted counties as a standard geographical unit of analysis in conducting equal employment opportunity and disparity analyses;
- county boundaries are determined by the state legislature and hence are free from any bias that might result from the researcher's determination of boundaries of geographical units of analysis; and
- census and other federal and state data are routinely collected and reported by county.

The potential relevant market area MGT considered for its disparity analyses was all counties in the U.S. from which the City hires contractors for construction services. MGT defined the relevant market area as all counties with prime contractors that were awarded at least 75 percent of the City's contracting dollars in a business category during the study period of January 1993, through December 1997. Therefore, MGT included in the market area all counties containing contractors that received 75 percent of City contracting dollars.

MGT summarized final construction contract dollar amounts by county and sorted the contract awards by county in descending order. MGT adopted 75 percent as the market area based on the rationale used by the Tenth Circuit in *Concrete Works of Colorado v. City and County of Denver.*[1] In *Concrete Works,* the court held that the relevant market area need not be confined by jurisdictional boundaries, but it is important that the pertinent data closely relate to the jurisdictional area of the municipality enacting the program.[2] By including in the market area all counties containing contractors that received 75 percent of contracting dollars, MGT considered the Court's guidance and balanced the economic reality that contracts are often awarded to firms located in adjacent areas, with the concept that pertinent data must closely relate to the jurisdiction enacting the program.[3]

[1] *Concrete Works of Colorado v. City and County of Denver,* 36 F.3d 1513,1520 (10th Cir. 1994).
[2] *Id.*
[3] *Id.*

MGT examined the contract dollars paid at the prime level to determine the relevant market area.

4.1.5 Utilization Analysis

Using final contract amounts paid to primes and award amount data for subcontractors, MGT calculated the percent of contract and subcontract dollars within the relevant market area. Utilization of subcontractors was based on those prime contracts that had subcontracting activity. MGT analyzed the percent of contract dollars for each M/WBE classification per calendar year at the prime contracting and subcontracting level. The next step was to calculate the percent of prime contract (and subcontract) dollar amounts by M/WBE classification for the entire five-year period. Utilization was calculated for each M/WBE classification individually.

The dollar amounts for each calendar year included all contracts awarded to prime contractors within the relevant market area; all contracting dollars going to prime contractors located outside the market area were excluded from the analyses. Based on MGT's calculations of the relevant market area, the excluded dollars comprised less than 10 percent of total dollars awarded. For subcontractors, awards to M/WBE firms working for prime contractors in the market area were used in calculating the percent of M/WBE subcontracting.

MGT analyzed the final construction contract dollar amounts by county for the relevant five-year period of the study. In addition, the data were also analyzed by:

- number of contracts or purchase orders;
- percent of contracts or purchase orders;
- number of unique firms;
- percent of total firms;
- dollars spent or awarded; and
- percent of total dollars.

In order to depict the total dollars retained by non-M/WBE and M/WBE prime and subcontractors of construction contracts after project completion, MGT used the following methodology:

- In the first step, the dollars retained by primes in each M/WBE classification were calculated by deducting subcontractor award amounts from prime contract award amounts:

  [e.g., Prime Contract Award \$ (MBE_1) – Subcontractor \$ ($MBE_{1...N}$) = Prime Retained \$ (MBE_1)]

- In the second step, to report the total dollars for each group's primes and subcontractors combined, the amounts awarded to each group's subcontractors were then combined with the amount of dollars retained by primes in each group:

  [e.g., Prime Retained \$ (MBE_1) + Subcontractor \$ (MBE_1) = MBE_1 Combined \$]

4.1.6 Availability Analysis

Determining the available pool of minority-owned, woman-owned, and non-minority-owned vendors able to provide services to an agency is critical to a disparity study. The number of available firms is compared to the utilization of firms to determine whether disparity exists. Through the use of Standard Industrial Classification (SIC) codes,[4] the geographic unit of analysis, and census data, MGT determined M/WBE availability in the relevant market area for construction and purchasing. MGT used the following U.S. Bureau of Census (Census Bureau) documents:

- *Survey of Minority-Owned Businesses (SMOBE)*
  - *SMOBE* contains the number of MBEs by county, by MBE ethnic classifications, by gender, and by SIC code.
  - The *SMOBE* survey is conducted every five years. The last two surveys were conducted in 1987 and 1992.

[4] The Federal Office of Management and Budget establishes SIC codes. The classification divides companies by the type of business activity in which they are primarily engaged. The activity is determined by the major product produced or service rendered. This coding system consists of 11 major industries in which there are 99 major groups of firms. These groups are further divided into a multitude of minor groups identified by a four-digit SIC code. The SIC codes chosen were used to identify the availability of construction firms.

- *Survey of Women-Owned Businesses (SWOBE)*
  - *SWOBE* contains a list of all women-owned firms by county and by SIC code.
  - The *SWOBE* survey is conducted every five years. The last two surveys were conducted in 1987 and 1992.
- *County Business Patterns*
  - *County Business Patterns* contains the total number of business establishments by state, county, and by SIC code.
  - *County Business Patterns* is published annually.

Census data were used because the approach to determining availability based on census data has numerous inherent strengths.

- the data have been derived through rigorous statistical methods;
- the data have been objectively derived with no race/gender biases that might affect the relative percentages of firms in the different race/gender categories;
- the data are readily available on a county by county basis;
- all firms have a proven history of earning revenues in their field(s) of service and, therefore, in our professional opinion, can be considered as available and capable of providing services in their respective service field(s);
- prime and subcontracting firms are included;
- the data are equally reliable for historical time periods;
- the data are statistically reliable in identifying the race/gender category of firm owners;
- the data are statistically reliable in identifying the field(s) of service (*i.e.*, SIC categories) of the firms; and
- the data provide the most accurate and reliable count of available firms by race/gender/ethnic category.

To obtain more detailed data than was available in published reports, MGT requested and received a 1992 database from the Census Bureau containing the number of firms by SIC code in each minority and women classification for each county

in the United States. The Census Bureau also provided a tabulation of the total number of firms located in each county by industry division.

In determining the number of firms available in each business category, MGT was careful to include only those firms that provided the same types of commodities and services as in construction contracting and purchasing respectively. Exhibit 4-1 provides a list of the SIC codes that were used to calculate the availability of firms in the market area. The number of M/WBEs by ethnic/gender classification was taken from the *SMOBE* and *SWOBE* reports and special tabulations requested from the Census Bureau. The number of non-M/WBEs is the difference between the total number of firms and the number of M/WBE firms in all ethnic/gender categories.

EXHIBIT 4-1
BUSINESS CATEGORIES AND
STANDARD INDUSTRIAL CODES (SIC)
USED FOR THE CITY OF PHOENIX ANALYSIS

BUSINESS CATEGORY / CATEGORY DESCRIPTION	SIC CODES
CONSTRUCTION PRIME CONTRACTS	
Construction Industries:	
Building Construction	15
Heavy Construction, Except Buildings	16
CONSTRUCTION SUBCONTRACTS	
Building Construction	15
Heavy Construction, Except Buildings	16
Special Trade Contractors	17
GENERAL SERVICES	
Service Industries:	
Printing & Publishing	27
Transportation Services	47
Electric, Gas, & Sanitary Services	49
Business Services	73
Auto Repair, Services & Parking	75
Misc. Repair Services	76
Educational Services	82
COMMODITIES	
Wholesale Trade:	
Wholesale Trade - Durable	50
Wholesale Trade - Non-durable	51
Retail Trade:	
Building Materials & Garden Supp.	52
General Merchandise Stores	53
Auto Dealers & Service Stations	55
Apparel & Accessory Stores	56
Furniture & Home Furnishing Stores	57

Exhibit 4-2 shows the actual number of construction firms in Maricopa County for 1987 and 1992 according to the U.S. Economic Census. The growth in the number of firms between the two census years was extrapolated to determine the number of available firms for the study years from 1993 to 1997. The census provided data for each business category and was used to determine the availability of firms during the study period.

EXHIBIT 4-2
NUMBER OF CONSTRUCTION PRIME CONTRACTORS IN MARICOPA COUNTY BASED ON 1987 AND 1992 ECONOMIC CENSUS DATA

	AFRICAN AMERICAN	HISPANIC	ASIAN & NATIVE AMERICAN	NON-MINORITY FEMALE	NON-MINORITY MALE	TOTAL FIRMS
1987 CENSUS	4	17	3	60	557	641
1992 CENSUS	3	19	18	165	477	682

Source: U.S. Economic Census 1987, 1992.

As indicated, the last two editions of *SMOBE* and *SWOBE* reported data only for 1987 and 1992, requiring MGT to determine the number of M/WBE and non-M/WBE firms for all other years in the study. MGT estimated availability for 1993 through 1997 using a straight-line growth formula for each M/WBE classification in each business category. MGT calculated a straight-line (non-compound) growth as follows:

- We determined the total growth (decline) of M/WBEs and non-M/WBEs by classification for each business category in the relevant market area from 1987 to 1992 based on census data;
- We divided by five to find average growth/decline;
- We multiplied the average growth/decline rate for each M/WBE classification by the number of firms;
- We multiplied the average growth/decline rate for each M/WBE classification by the number of firms available for that classification in 1992, the base year, to obtain the number of firms to add to/subtract from each year; and
- The derived number of firms were added to the number of firms in the base firms in the base year to obtain 1993. The same derived number of firms were then added to the 1993 totals to obtain 1994 figures, and so on through 1997.

To obtain a straight-line (non-compound) growth, we added the derived number of firms to the number of firms in the base year to obtain 1993 figures, then added that same derived number of firms to 1993 figures to obtain 1994 figures, etc. through 1997.

The use of straight-line growth yields a lower estimation of firm availability than using a compound growth rate, which is frequently used for economic projections. MGT was confident in using straight-line growth here since M/WBEs frequently have higher growth rates than the market as a whole. Straight-line growth calculations are, therefore, not only a theoretically sound approach, but also a conservative approach for projecting the number of M/WBE firms currently available in Maricopa County.

4.1.7 Determination of Disparity

MGT compared the utilization of each group with its availability within the relevant market area to determine whether disparity exists for an M/WBE or non-M/WBE group within a specific business category. The disparity index reveals any level of disparity. A disparity index of 0.00 shows no utilization. An index of exactly 100 indicates parity between utilization and availability. A disparity index below 100 constitutes underutilization. For the purpose of this disparity study, an M/WBE or non-M/WBE group with a disparity index below 80 is substantially underutilized and is marked with an asterisk (*) in the disparity analysis exhibits later in this chapter.

While a number of indices could be used, the index must be easy to calculate, interpret, and compare. Multiply the ratio of the percentage of utilization to the percentage of available firms in an M/WBE classification by 100 to obtain the disparity index of choice. Equation 1 summarizes the formula:

$$(1)\ \text{Disparity Index} = \frac{\%Um_1p_1}{\%Am_1p_1} \times 100$$

Where: Um_1p_1 = utilization of M/WBE_1 for $procurement_1$
Am_1p_1 = availability of M/WBE_1 for $procurement_1$

As with any ratio, a disparity index value of 100 signifies equality between the numerator and denominator. The disparity index point of 80 is based on the Equal Employment Opportunity Commission's "80 percent rule" adopted in the Uniform Guidelines on Employee Selection Procedures.

In the employment discrimination context, a disparity ratio below 80 indicates a substantial level of disparity demonstrating adverse or disparate impact[5]. The Supreme Court accepted the use of the 80 percent rule in *Connecticut v. Teal*[6]. To determine significant underutilization of minority- and women-owned businesses contracting with municipalities, the Eleventh Circuit in *Engineering Contractors Association of South Florida, Inc. v. Metropolitan Dade County* adopted the 80 percent rule.[7] In determining this threshold, the court referenced the Equal Employment Opportunity Commission's disparate impact guidelines.[8] Thus, MGT based its designation of disparity on the Supreme Court decision.

4.1.8 Significance of Proportions Test

In addition to the disparity index, MGT conducted a significance of proportions test to determine whether statistical differences exist between utilization and availability. The significance of proportions test compares whether two proportions come from equivalent samples. At a very simple level, the test determines whether there is a difference between two values. More formally, the significance of proportions test examines the following hypothesis:

H_o: $\pi=\pi_o$

H_a: $\pi\neq\pi_o$

[5] See 29 C.F.R. §.1607.4D (1981).
[6] *Connecticut v. Teal,* 457 U.S. 440 (1982).
[7] *Engineering Contractors Association of South Florida, Inc. v. Metropolitan Dade County, 122 F.3d895,914 (11th Cir. 1997).*
[8] *Id.*

(π = Utilization proportion, π_o = Availability proportion)

A hypothesis is simply a statement about some characteristic of a variable or variables. This hypothesis tests whether two proportions are statistically equivalent or could be representative of the same variable. The null hypothesis (H_o) provides the statement for testing. In the case of the significance of proportions test, the null hypothesis states that the two proportions are statistically equivalent. The alternative hypothesis (H_a) accounts for the opposite of the null hypothesis or, for our purposes, the chance that the proportions are not equal. In order to draw a conclusion regarding the two hypotheses, a test statistic is produced. The test statistic is compared to a range of values determined by the researcher and a conclusion is drawn regarding the likelihood of the null hypothesis' validity.

The decision to accept or reject the null hypothesis[9] is contingent on the decision rule, or the alpha level selected. The alpha level is the probability that the result or outcome could occur by chance. The smaller the alpha level, the more difficult it will be to reject the null hypothesis between availability and utilization. An alpha level of .05 reflects the probability that the obtained result could occur by chance is only five out of 100. This probability is so small that we can be 95 percent certain that we will not reject the null hypothesis between availability and utilization when none exists.

The alpha level is used to produce the confidence interval for testing the hypothesis. The confidence interval indicates how likely it is that a variable will fall within a range of values and provides a good idea of the faith one can have in the likelihood of the occurrence of a value. Using the normal distribution, we can assume that 90, 95, and 99 percent of values fall within 1.64, 1.96, and 3.00 standard deviations of the

[9] The null hypothesis tests if there is a statistically significant difference between availability and utilization for accuracy that no difference is present.

mean, respectively. When performing a hypothesis test, we select a confidence interval for decision-making and compare the test statistic to the interval ranges. For example, assuming a 95 percent confidence interval, the range for failing to reject the null hypothesis or failing to find sufficient evidence against the statement would be between –1.96 and 1.96. Therefore, in this example, if the test statistic yields a value greater than 1.96 or less than –1.96, the conclusion would be drawn that insufficient evidence is present to support the null hypothesis and it would be rejected.

The hypothesis listed above is a two-tail test. Meaning that both ends of the normal distribution are considered in decision-making. However, by including a greater or less than sign in the alternative hypothesis, a one-tail specification could be represented. The one-tail test is useful when the researcher has an idea about the direction the relationship should follow. When ascertaining the confidence interval for the one-tail test, the interval is concentrated on one side of the normal distribution. Consequently, the interval for one-tail tests would be 1.28, 1.65, and 2.33 for 90, 95, and 99 percent levels of confidence.

Equation 2 summarizes the test statistic used to judge the hypothesis.

$$(2) \quad z=(\pi-\pi_o)/\sqrt{\pi_o(1-\pi_o)/n}$$

Where:

Z = z-statistic
π = utilization probability
π_o = availability probability
n = sample size

When dealing with a sample size less than 30, a *t*-statistic is generated, while a *z*-statistic is used for larger samples. If the test statistic falls in the range specified by the confidence interval, then statistical disparity is very unlikely. Conversely, if the value lies outside of the range, disparity between utilization and availability is present.

4.2 Construction

MGT's findings for construction contracting for the City of Phoenix are provided in this section.

The City let $1.4 billion in construction contracts from January 1, 1993, through December 31, 1997. These contracts were let through the City's Engineering and Architectural Services Department and Materials Management Division of the Finance Department. All construction contracts let by the City during the five-year study period are analyzed in this section.

Our analyses includes the following:

- Market Area Analysis
- Prime Contractor Utilization Analysis
- Prime Contractor Availability Analysis
- Prime Contractor Disparity Analysis
- Subcontractor Utilization Analysis
- Subcontractor Availability Analysis
- Subcontractor Disparity Analysis
- Findings and Recommendations

4.2.1 Market Area Analysis

Exhibit 4-3 shows Phoenix's market area for construction contracts—all U.S. counties in which the City of Phoenix awarded construction dollars to firms located in these counties. The relevant market areas, on the other hand, are those counties in which Phoenix awarded 75 percent or more of its total construction dollars to firms located there.

MGT concluded that firms located in Maricopa County received well over 75 percent of City construction dollars; therefore, it is the relevant market area for the study. Almost 93 percent of the City's construction dollars went to firms located in Maricopa County. Five of every six firms hired for construction services were located in Maricopa County and approximately 87 percent of the contracts let during the study period were

EXHIBIT 4-3
MARKET AREA ANALYSIS
CONSTRUCTION
CALENDAR YEARS 1993 THROUGH 1997

COUNTY	# OF CONTRACTS	% OF CONTRACTS	# OF FIRMS	% OF FIRMS	DOLLARS	%OF DOLLARS	CUM% [1]	
MARICOPA, AZ	**4695**	**86.80%**	**496**	**83.22%**	**$1,304,529,231.03**	**92.93%**	**92.93%**	[2]
JEFFERSON, CO	68	1.26%	1	0.17%	$48,316,624.87	3.44%	96.37%	
LOS ANGELES, CA	72	1.33%	13	2.18%	$18,877,422.53	1.34%	97.71%	
GALLATIN, MT	16	0.30%	1	0.17%	$7,957,391.27	0.57%	98.28%	
PIMA, AZ	46	0.85%	7	1.17%	$6,851,463.39	0.49%	98.77%	
SALT LAKE, UT	15	0.28%	2	0.34%	$3,571,869.15	0.25%	99.02%	
BERGEN, NJ	1	0.02%	1	0.17%	$2,282,000.00	0.16%	99.19%	
VENTURA, CA	2	0.04%	1	0.17%	$1,722,970.40	0.12%	99.31%	
ORANGE, CA	21	0.39%	7	1.17%	$1,121,416.63	0.08%	99.39%	
DAUPHIN, PA	6	0.11%	2	0.34%	$1,090,673.29	0.08%	99.47%	
COOK, IL	21	0.39%	9	1.51%	$1,083,923.30	0.08%	99.54%	
HENNEPIN, MN	1	0.02%	1	0.17%	$1,071,978.00	0.08%	99.62%	
MOHAVE, AZ	9	0.17%	1	0.17%	$1,067,882.01	0.08%	99.70%	
ANOKA, MN	6	0.11%	1	0.17%	$957,185.87	0.07%	99.76%	
DAKOTA, MN	5	0.09%	1	0.17%	$472,754.10	0.03%	99.80%	
YAVAPAI, AZ	4	0.07%	1	0.17%	$464,665.24	0.03%	99.83%	
HARRIS, TX	289	5.34%	3	0.50%	$341,587.00	0.02%	99.86%	
DALLAS, TX	4	0.07%	7	1.17%	$333,018.24	0.02%	99.88%	
HARTFORD, CT	11	0.20%	1	0.17%	$284,547.51	0.02%	99.90%	
SAN DIEGO, CA	6	0.11%	3	0.50%	$258,311.57	0.02%	99.92%	
DENVER, CO	10	0.18%	3	0.50%	$231,722.33	0.02%	99.93%	
SAN FRANCISCO, CA	11	0.20%	1	0.17%	$217,568.99	0.02%	99.95%	
ALLEGHENY, PA	8	0.15%	2	0.34%	$174,964.82	0.01%	99.96%	
CLARK, WA	10	0.18%	1	0.17%	$132,294.00	0.01%	99.97%	
BERNALILLO, NM	1	0.02%	1	0.17%	$95,896.65	0.01%	99.98%	
MIDDLESEX, MA	6	0.11%	1	0.17%	$89,112.45	0.01%	99.98%	
KING, WA	2	0.04%	3	0.50%	$50,598.48	0.00%	99.99%	
SANTA FE, NM	1	0.02%	1	0.17%	$42,350.00	0.00%	99.99%	
WASHINGTON, OR	19	0.35%	1	0.17%	$18,750.00	0.00%	99.99%	
NEWTON, GA	1	0.02%	1	0.17%	$18,366.86	0.00%	99.99%	
SOMERSET, NJ	2	0.04%	1	0.17%	$14,872.00	0.00%	100.00%	
RICHMOND (CITY), VA	7	0.13%	1	0.17%	$11,980.63	0.00%	100.00%	
LAKE, IL	6	0.11%	2	0.34%	$9,141.25	0.00%	100.00%	
HILLSBOROUGH, FL	1	0.02%	1	0.17%	$8,852.22	0.00%	100.00%	
MECKLENBURG, NC	4	0.07%	1	0.17%	$7,430.90	0.00%	100.00%	
UINTA, WY	1	0.02%	1	0.17%	$5,059.47	0.00%	100.00%	
ONONDAGA, NY	1	0.02%	1	0.17%	$4,987.32	0.00%	100.00%	
OAKLAND, MI	1	0.02%	1	0.17%	$3,541.69	0.00%	100.00%	
ROCK ISLAND, IL	1	0.02%	1	0.17%	$2,655.14	0.00%	100.00%	
SAN MATEO, CA	6	0.11%	2	0.34%	$2,253.14	0.00%	100.00%	
EL PASO, TX	1	0.02%	1	0.17%	$2,212.63	0.00%	100.00%	
DOUGLAS, NE	1	0.02%	1	0.17%	$2,089.77	0.00%	100.00%	
CONTRA COSTA, CA	3	0.06%	1	0.17%	$2,025.00	0.00%	100.00%	
CLARK, NV	1	0.02%	1	0.17%	$1,335.89	0.00%	100.00%	
ESSEX, MA	1	0.02%	1	0.17%	$1,250.94	0.00%	100.00%	
PEORIA, IL	1	0.02%	1	0.17%	$1,173.75	0.00%	100.00%	
CUYAHOGA, OH	1	0.02%	1	0.17%	$680.00	0.00%	100.00%	
PINAL, AZ	1	0.02%	1	0.17%	$435.00	0.00%	100.00%	
POLK, IA	1	0.02%	1	0.17%	$408.25	0.00%	100.00%	
KANE, IL	1	0.02%	1	0.17%	$37.50	0.00%	100.00%	
TOTAL	**5,409**	**100.00%**	**596**	**100.00%**	**$1,403,810,962.47**			

SOURCE: City of Phoenix Engineering & Architectural Services, City Clerk's Archives, Materials Management

[1] Cumulative total of percentage of dollars in market area.

[2] Counties above the line are included in the relevant market area.

let to firms located in Maricopa County. The market area analysis for construction clearly demonstrates that Maricopa County is the relevant geographic area for conducting availability, utilization, and disparity analyses for the City of Phoenix's construction procurement.

4.2.2 Prime Contractor Utilization

The City's construction expenditures varied considerably over the course of the five-year study period. It is important to note that the City's current M/WBE program did not take effect until November 1993. While there was not a consistent increase in spending from year to year, the City's construction costs for calendar year 1997 were over seven times greater than costs for 1993. City spending increased almost 300 percent from 1993 to 1994. The increase continued from 1994 to 1995, but it slowed to a 66 percent increase. Spending for 1996 was down about 34 percent from 1995; and 1997 saw a 75 percent increase in spending compared to 1996.

The first year of the study contained substantially fewer contracts, for a smaller dollar amount per contract than in subsequent study years. Exhibit 4-4 compares the number of contracts let for each year and the average amount of each contract within that calendar year.

EXHIBIT 4-4
CONSTRUCTION CONTRACTS
CONTRACTS PER YEAR AND AVERAGE CONTRACT AMOUNT

YEAR	NUMBER OF CONTRACTS	AVERAGE AMOUNT OF CONTRACT	TOTAL
1993	263	$214,976.56	$56,538,835.69
1994	923	$239,703.92	$221,246,718.30
1995	1,064	$344,580.99	$366,634,172.71
1996	1,074	$223,699.36	$240,253,114.93
1997	1,371	$306,240.96	$419,856,359.40
ALL YEARS	4,695	$277,854.99	$1,304,529,201.03

Source: Engineering & Architectural Services Central Records

Exhibit 4-5 shows the 15 contracts the City awarded in excess of $10 million. Six of those contracts were awarded in 1997 and represent 40.4 percent of the dollar total for contracts over $10 million. There was one contract over $10 million in 1996 for 2.6 percent; five in 1995 are 45.3 percent of the total; three in 1994 comprise 11.7 percent; and no contracts were awarded in 1993.

EXHIBIT 4-5
CONSTRUCTION CONTRACTS OVER $10 MILLION
BY YEAR, COUNTY, AND AMOUNT
CITY OF PHOENIX

YEAR	COUNTY	AMOUNT	PROJECT DESCRIPTION
95	MARICOPA, AZ	$64,019,763.00	Waste Water Treatment Plant
97	MARICOPA, AZ	$55,991,649.70	Airport Runway & Taxiway
95	MARICOPA, AZ	$52,816,360.00	Water Treatment Plant Expansion
97	MARICOPA, AZ	$45,486,965.00	Criminal Justice Facility
95	MARICOPA, AZ	$33,169,248.00	Airport Terminal Expansion
97	MARICOPA, AZ	$26,355,447.00	Civic Plaza East Garage
95	MARICOPA, AZ	$22,457,446.14	Landfill Environmental Cleanup
94	MARICOPA, AZ	$21,363,493.00	Little Theatre/Art Museum
94	MARICOPA, AZ	$16,877,097.00	Arizona Science Museum
97	MARICOPA, AZ	$15,888,000.24	Maryvale Baseball Stadium
95	MARICOPA, AZ	$15,717,574.00	Waste Water Treatment Plant
97	MARICOPA, AZ	$12,270,112.00	Aircraft Maintenance Complex
97	MARICOPA, AZ	$11,661,257.05	Access Road Construction
96	MARICOPA, AZ	$10,992,613.00	27th Avenue Waste Management
94	MARICOPA, AZ	$10,396,874.00	Civic Plaza Refurbishment

Source: Engineering & Architectural Services Central Records

The seven highest contract dollar amounts were awarded in 1997 and 1995, contributing to the higher average dollar amount in those two years relative to the other years.

Exhibit 4-6 shows the utilization of prime contractors by year and ethnicity/gender classification.

Calendar Year 1993

- African American, Asian, and Native American-owned prime contractors were not utilized on any of the City's construction projects. Hispanic and woman-owned firms each received about 0.2 percent of the contract dollars.

EXHIBIT 4-6
UTILIZATION OF PRIME CONSTRUCTION FIRMS
BY RACE, ETHNIC, AND GENDER CLASSIFICATION
FOR CALENDAR YEARS 1993 THROUGH 1997
CITY OF PHOENIX

CALENDAR YEAR	AFRICAN AMERICAN		HISPANIC AMERICAN		ASIAN & NATIVE AMERICAN		NON-MINORITY WOMEN		NON-MINORITY MEN		TOTAL	TOTAL MINORITY
	$	%	$	%	$	%	$	%	$	%	$	%
1993	$0.00	0.00%	$126,831.00	0.22%	$0.00	0.00%	$111,239.00	0.20%	$56,300,765.69	99.58%	$56,538,835.69	0.42%
1994	$0.00	0.00%	$5,093,134.26	2.30%	$164,159.83	0.07%	$0.00	0.00%	$215,989,424.21	97.62%	$221,246,718.30	2.38%
1995	$0.00	0.00%	$5,614,226.46	1.53%	$0.00	0.00%	$417,563.62	0.11%	$360,602,382.63	98.35%	$366,634,172.71	1.65%
1996	$85,706.09	0.04%	$4,192,572.63	1.75%	$0.00	0.00%	$61,248.50	0.03%	$235,913,587.71	98.19%	$240,253,114.93	1.81%
1997	$0.00	0.00%	$6,537,370.37	1.56%	$522.95	0.00%	$1,140,024.53	0.27%	$412,178,441.55	98.17%	$419,856,359.40	1.83%
TOTAL	$85,706.09	0.01%	$21,564,134.72	1.65%	$164,682.78	0.01%	$1,730,075.65	0.13%	$1,280,984,601.79	98.20%	$1,304,529,201.03	1.80%

SOURCE: Engineering & Architectural Services, Materials Management - City of Phoenix

- All M/WBE prime contracting for the first year of the study period accounted for just over 0.4 percent of the total construction contract dollars. Non-minority male-owned firms were awarded 99.58 percent, almost all of the construction contract dollars for 1993.

- Of the 263 contracts awarded in 1993, minority prime contractors were awarded eight (two Hispanic-owned and six women-owned contractors were awarded contracts).

Calendar Year 1994

- There was no utilization of African American prime contractors in 1994. Asian and Native American-owned firms did receive contracts for 0.07 percent of 1994 construction dollars. Non-minority women-owned firms were not awarded any contracts, while Hispanic firms received a substantial increase in contract dollars compared to their 1993 amount. Hispanic firms collected 2.3 percent of contract dollars.

- The total prime contract dollars awarded to M/WBE contractors increased from the previous year's 0.42 percent to 2.38 percent. This rate of utilization is the highest percentage during the study period. Non-minority male-owned primes performed over 97.6 percent of the prime construction work in 1994.

Calendar Year 1995

- For the third year of the study period, African American prime contractors did not receive any of the construction dollars. Hispanic firms saw an increase in their utilization for the second consecutive year, although their utilization percentage dropped to 1.5 percent of the construction dollars. Asian and Native American firms received no contracts for the year. However, woman-owned firms, that had received no contracts in the previous year were awarded just over 0.11 percent of the dollars for 1995.

- In all, M/WBEs were awarded 1.65 percent of the construction procurement for 1995, down from over 2.3 percent from 1994. Non-minority male-owned firms again performed over 98 percent of the prime construction.

Calendar Year 1996

- In 1996, the City utilized African American prime contractors in 0.04 percent of the construction procurement. The contract to an African American firm brought the overall utilization of African American-owned primes to 0.01 percent for the study period. Hispanic-owned primes were awarded 1.75 percent, women-owned companies received 0.03 percent in 1996, and Asian and Native American companies had no utilization.

- M/WBE utilization overall rose to 1.81 percent of construction for 1996. Overall spending for 1996 was down 34 percent from the previous year.

Calendar Year 1997

- The City did not award any contracts to African American prime contractors in 1997. Utilization of Hispanic firms saw the highest dollar amount during the study period. The Hispanic portion, $6.5 million, represented 1.56 percent of the total for 1997. Asian and Native American primes received one contract for a negligible amount, while women-owned firms accounted for 0.27 percent of the prime construction dollars for 1997.

- Overall, construction spending increased from the 1996 amount. Construction procurement for 1997 was 75 percent higher than in the previous year. Despite the increase in dollar expenditures, the utilization of minority firms remained consistent, even gaining a small amount on the 1996 percentage. In 1997, as in the preceding four years, utilization of non-minority male prime contractors was at least 97 percent.

4.2.3 Prime Contractor Availability

Exhibit 4-7 shows the estimated availability of prime construction firms to conduct work for the City during the five years of the study period. The average availability of non-minority male-owned prime construction contractors during the five-year period from 1993 through 1997 was 66.48 percent. Non-minority woman-owned firms comprised 26.5 percent of the companies available to perform the City's construction projects. Hispanic contractors were 2.86 percent; Asian and Native American firms were 3.81 percent; and African American-owned firms represented only 0.34 percent of the total available firms.

After reviewing the availability of construction prime contractors for Maricopa County, MGT found:

- Over the five years of the study, African American prime contractors decreased in availability, though only by a single firm. The total number of available firms increased, further reducing the relative availability of African American firms.

EXHIBIT 4-7
ESTIMATED AVAILABILITY OF PRIME CONSTRUCTION CONTRACTORS IN MARICOPA COUNTY
BASED ON CENSUS DATA
FOR CALENDAR YEARS 1993 THROUGH 1997
CITY OF PHOENIX

YEAR	AFRICAN AMERICAN[1]		HISPANIC AMERICAN[1]		ASIAN & NATIVE AMERICAN		NON-MINORITY WOMEN[2]		NON-MINORITY MEN[3]		TOTAL FIRMS[4]
	#	%	#	%	#	%	#	%	#	%	
1993	3	0.43%	19	2.75%	21	3.04%	151	21.88%	496	71.88%	690
1994	3	0.43%	20	2.87%	24	3.44%	169	24.21%	482	69.05%	698
1995	2	0.28%	20	2.83%	27	3.82%	188	26.63%	469	66.43%	706
1996	2	0.28%	21	2.94%	30	4.20%	206	28.81%	456	63.78%	715
1997	2	0.28%	21	2.90%	33	4.56%	224	30.98%	443	61.27%	723
AVG	2	0.34%	20	2.86%	27	3.81%	188	26.50%	469	66.48%	706

NOTE: Details may not add to TOTAL FIRMS due to rounding.

SOURCES OF DATA: U.S. Bureau of the Census

- **Survey of Minority Owned Businesses (SMOBE) - 1987 & 1992 (African Americans, Hispanic Americans, Asian Americans, Native Americans and Other Minorities).**
- **Survey of Women Owned Businesses (SWOBE) - 1987 & 1992.**

[1] **Minority men and women firms are included in their respective minority classifications.**

[2] **The number of NON-MINORITY WOMEN construction firms was estimated by subtracting the number of minority women-owned construction firms from the census count of total women-owned construction firms. According to national statistics, African American women-owned construction firms comprise 6.28 percent of African American construction firms; Hispanic women-owned construction firms comprise 4.37 percent of Hispanic American construction firms; and other minority women-owned construction firms comprise 7.38 percent of other minority construction firms.**

[3] **Number of NON-MINORITY MEN firms derived by subtracting all M/WBE firms from TOTAL FIRMS.**

[4] **TOTAL FIRMS derived from the U.S. Bureau of Census and County Business Patterns.**

- Hispanic-owned firms increased over the study period. The number of available Hispanic-owned firms increased from 19 in 1993, to 21 in 1997. Hispanic firms experienced a very slight growth in availability during the study period.

- Asian and Native American-owned firms experienced growth in availability greater than that of Hispanic prime contractors. Asian and Native American firms increased from 21 in 1993, to 33 in 1997, representing a 57 percent increase over the course of the study period.

- Non-minority women-owned prime contractors were the largest category of M/WBE prime contractors. These contractors comprised almost 22 percent of available firms in the first year of the study period. By the end of the study, women-owned firms were 31 percent of available firms. Women-owned firms also experienced the largest growth in availability during the study, increasing over 48 percent from 1993 to 1997.

Non-minority male-owned firms decreased significantly in availability during the study period. This was the only group of available prime contractors that experienced a significant decline in availability during the study period. In 1993, non-minority male contractors represented over 70 percent of all contractors. By 1997, non-minority male contractors were just over 60 percent of available firms. Available non-M/WBE prime contractors decreased by over 10 percent from 1993 to 1997.

4.2.4 Prime Contractor Disparity

Exhibit 4-8 details the disparity analysis for prime construction contractors. This chart compares utilization by the percent of contract dollars paid in the first column and availability by percent of available firms in the second column. To determine the disparity index, multiply the ratio of utilization to availability by 100. An index of 100 indicates parity between utilization and availability. An index of less than 80 shows "substantial disparity" and an index above 100 shows overutilization.

EXHIBIT 4-8
PRIME CONSTRUCTION CONTRACTORS
DISPARITY ANALYSIS BY RACE, ETHNIC, AND GENDER CLASSIFICATION
USING CENSUS DATA
FOR CALENDAR YEARS 1993 THROUGH 1997
CITY OF PHOENIX

M/WBE CLASSIFICATION	% OF CONTRACT DOLLARS[1]	% OF AVAILABLE FIRMS[2]	DISPARITY INDEX[3]	DISPARATE IMPACT OF UTILIZATION[4]	SIGNIFICANCE OF PROPORTION[5]
CALENDAR YEAR 1993					
AFRICAN AMERICAN	0.00%	0.43%	0.00	* UNDERUTILIZATION	-0.11
HISPANIC	0.22%	2.75%	8.15	* UNDERUTILIZATION	-0.67
ASIAN & NATIVE AMERICAN	0.00%	3.04%	0.00	* UNDERUTILIZATION	-0.81
NON-MINORITY WOMEN	0.20%	21.88%	0.90	* UNDERUTILIZATION	* -6.45
NON-MINORITY MEN	99.58%	71.88%	138.53	OVERUTILIZATION	* 13.72
CALENDAR YEAR 1994					
AFRICAN AMERICAN	0.00%	0.43%	0.00	* UNDERUTILIZATION	-0.11
HISPANIC	2.30%	2.87%	80.34	* UNDERUTILIZATION	-0.15
ASIAN & NATIVE AMERICAN	0.07%	3.44%	2.16	* UNDERUTILIZATION	-0.90
NON-MINORITY WOMEN	0.00%	24.21%	0.00	* UNDERUTILIZATION	* -7.35
NON-MINORITY MEN	97.62%	69.05%	141.37	OVERUTILIZATION	* 13.58
CALENDAR YEAR 1995					
AFRICAN AMERICAN	0.00%	0.28%	0.00	* UNDERUTILIZATION	-0.08
HISPANIC	1.53%	2.83%	54.05	* UNDERUTILIZATION	-0.35
ASIAN & NATIVE AMERICAN	0.00%	3.82%	0.00	* UNDERUTILIZATION	-1.04
NON-MINORITY WOMEN	0.11%	26.63%	0.43	* UNDERUTILIZATION	* -8.22
NON-MINORITY MEN	98.35%	66.43%	148.06	OVERUTILIZATION	* 14.64
CALENDAR YEAR 1996					
AFRICAN AMERICAN	0.04%	0.28%	12.75	* UNDERUTILIZATION	-0.07
HISPANIC	1.75%	2.94%	59.42	* UNDERUTILIZATION	-0.32
ASIAN & NATIVE AMERICAN	0.00%	4.20%	0.00	* UNDERUTILIZATION	-1.15
NON-MINORITY WOMEN	0.03%	28.81%	0.09	* UNDERUTILIZATION	* -9.12
NON-MINORITY MEN	98.19%	63.78%	153.97	OVERUTILIZATION	* 15.29
CALENDAR YEAR 1997					
AFRICAN AMERICAN	0.00%	0.28%	0.00	* UNDERUTILIZATION	-0.07
HISPANIC	1.56%	2.90%	53.61	* UNDERUTILIZATION	-0.37
ASIAN & NATIVE AMERICAN	0.00%	4.56%	0.00	* UNDERUTILIZATION	-1.26
NON-MINORITY WOMEN	0.27%	30.98%	0.88	* UNDERUTILIZATION	* -9.94
NON-MINORITY MEN	98.17%	61.27%	160.22	OVERUTILIZATION	* 15.94
SUMMARY					
AFRICAN AMERICAN	0.01%	0.34%	1.93	* UNDERUTILIZATION	-0.08
HISPANIC	1.65%	2.86%	57.82	* UNDERUTILIZATION	-0.32
ASIAN & NATIVE AMERICAN	0.01%	3.81%	0.33	* UNDERUTILIZATION	-1.03
NON-MINORITY WOMEN	0.13%	26.50%	0.50	* UNDERUTILIZATION	* -8.19
NON-MINORITY MEN	98.20%	66.48%	147.70	OVERUTILIZATION	* 14.55

[1] Percent of construction contract dollars awarded to firms. See Exhibit 4-6.

[2] Percent of available firms. See Exhibit 4-7.

[3] The disparity index is the ratio of percentage utilization to percentage availability multiplied by 100.

[4] An asterik (*) in front of UNDERUTILIZATION indicates a substantial level of disparity - index below 80.00.

[5] The significance of proportions test examines whether there is a statistical difference between utilization and availability. The test statistic is computed by taking the difference between utilization and availability and dividing by the square root of availability times one minus availability divided by the available firms. If the test statistic is greater than 2.0, overutilization is assumed. Conversely, if the test statistic is less than - 2.0, underutilization is assumed. An asterisk is used to represent significant difference between utilization and availability.

Overall, the disparity analysis of prime construction contractors indicates overutilization of non-minority male-owned firms and substantial underutilization of M/WBE firms in all years of the study period. Exhibit 4-8 demonstrates:

- African American firms had an average availability of 0.34 percent during the study period, yet in only one year were they awarded any of the City's prime construction dollars. The average disparity index for African American prime contractors during the entire study period was 1.93. Firms in this category were substantially underutilized during the study period.

- The average availability of Hispanic-owned firms during the study period was 2.86 percent, while those firms were utilized at a rate of 1.65 percent during the study period. The City let contracts to Hispanic firms in every year of the study, with the highest disparity index in 1994. Hispanic prime contractors were the most heavily utilized M/WBE classification, even though Hispanic-owned firms were still substantially underutilized during the years of the study.

- Asian and Native American firms had an average availability of 3.81 percent during the study period. However, only in 1994 were these contractors awarded prime construction dollars. Asian and Native American companies were only awarded 0.01 percent of construction dollars during the five years of the study. With a disparity index of 0.33 over the study period, Asian and Native American firms were substantially underutilized.

- Non-minority women-owned prime contractors were available at an average rate of 26.5 percent over the study period. However, they received only 0.13 percent of the construction contract dollars in the same period. The City awarded contracts to women-owned firms in four of the five years of the study, resulting in a disparity index of 0.50. Women-owned companies were substantially underutilized during the study period.

- Non-minority male-owned firms had the highest availability during the study period, constituting an average 66.48 percent of available firms during the study period. The City's utilization of those firms was over 98 percent in every year except one year of the study. The average disparity index for non-M/WBEs was 147.7, indicating substantial overutilization.

4.2.5 Subcontractor Utilization Analysis

Exhibit 4-9 illustrates the utilization of subcontractors for construction projects in the City of Phoenix. Subcontractor dollars were classified within their respective

EXHIBIT 4-9
UTILIZATION OF PRIME AND SUBCONTRACTORS
BY RACE, ETHNIC, AND GENDER CLASSIFICATION
FOR CALENDAR YEARS 1993 THROUGH 1997
CITY OF PHOENIX

CALENDAR YEAR	AFRICAN AMERICAN		HISPANIC AMERICAN		ASIAN AMERICAN		ASIAN & NATIVE AMERICAN		NON-MINORITY WOMEN		NON-MINORITY MEN		TOTAL ALL CATEGORIES	TOTAL M/WBE
	$	%	$	%	$	%	$	%	$	%	$	%	$	%
1993	$0.00	0.00%	$109,942.06	0.19%	$0.00	0.00%	$0.00	0.00%	$1,176,432.06	2.08%	$55,252,461.57	97.72%	$56,538,835.69	2.28%
1994	$0.00	0.00%	$4,702,801.65	2.13%	$0.00	0.00%	$182,129.83	0.08%	$585,022.68	0.26%	$215,776,764.14	97.53%	$221,246,718.30	2.47%
1995	$38,360.00	0.01%	$7,226,663.83	1.97%	$0.00	0.00%	$33,991.56	0.01%	$3,091,128.45	0.84%	$356,244,028.87	97.17%	$366,634,172.71	2.83%
1996	$301,207.69	0.13%	$4,487,262.03	1.87%	$0.00	0.00%	$12,118.00	0.01%	$1,057,824.78	0.44%	$234,654,783.44	97.56%	$240,513,195.94	2.44%
1997	$651,070.74	0.16%	$6,628,529.00	1.58%	$0.00	0.00%	$1,769,126.46	0.42%	$5,279,931.06	1.26%	$405,361,279.14	96.59%	$419,689,936.40	3.41%
TOTAL	$990,638.43	0.08%	$23,155,198.57	1.77%	$0.00	0.00%	$1,997,365.85	0.15%	$11,190,339.03	0.86%	$1,267,289,317.16	97.14%	$1,304,622,859.04	2.86%

Source: Engineering & Architectural Services, Materials Management- City of Phoenix

ethnic/gender category. The prime contractor for each contract was assigned the residual amount and those dollars were classified in the ethnic category of the prime contractor.

As Exhibit 4-9 shows:

- Approximately 2.9 percent of the total dollar amount spent on construction services during the study period went to M/WBE firms. Hispanic American firms were the most utilized group of M/WBEs. Hispanic-owned firms received 1.77 percent of the contract dollars for the study period while non-minority women-owned firms captured 0.86 percent of the total dollar amount.

- Asian and Native American-owned firms and African American-owned firms received 0.15 percent and 0.08 percent of construction dollars respectively. Overall, M/WBE utilization increased from 2.28 percent in 1993, to 3.41 percent in 1997. Utilization of minority subcontractors increased in every year of the study period except 1996. However, between 1996 and 1997, utilization rose from 2.44 percent to 3.41 percent, the highest rate within the study period.

Further, Exhibit 4-9 shows:

Calendar Year 1993

- African American, Asian, and Native American-owned firms were not utilized on any of the City's construction projects in 1993. Hispanic-owned firms were utilized at a rate of 0.19 percent, while women-owned contractors saw their highest utilization during the entire study period, 2.08 percent.

- The total M/WBE utilization for the first year of the study period was 2.28 percent. Non-minority male-owned firms were awarded 97.72 percent of the contract dollars. 1993 had the lowest utilization of M/WBE contractors during the five-year study period.

Calendar Year 1994

- African American contractors were not utilized in 1994. Utilization of Hispanic-owned firms increased to 2.13 percent. Asian and Native American contractors were awarded 0.08 percent of the construction dollars, while women-owned firms captured only 0.26 percent. Women-owned firms were utilized at their lowest rate during the study period in 1994.

- Overall minority utilization increased from 2.28 percent in 1993 to 2.47 percent in 1994. Non-minority male-owned firms captured 97.53 percent of the City's construction dollars for 1994. Construction spending almost quadrupled from the previous year and percent utilization of M/WBEs still managed to increase.

Calendar Year 1995

- 1995 was the first year of the study period in which African American contractors were used, though only at a rate of 0.01 percent. Hispanic-owned firms were awarded over $7 million in 1995, accounting for almost two percent of the total. Asian and Native American firms were also awarded 0.01 percent, a considerable decrease from 1994. Utilization of women-owned firms increased to 0.84 percent.

- Non-M/WBE utilization was down for the second consecutive year to 97.17 percent. M/WBE firms received 2.83 percent of the total construction dollars for 1995. Utilization of minority subcontractors rose for the second consecutive year, and overall construction spending rose again as well.

Calendar Year 1996

- For only the second year in four years, African American contractors received construction dollars for work on the City's projects. African American-owned firms received 0.13 percent of the work, while Hispanic firms' utilization went down to 1.87 percent from 1.97 the previous year. Asian and Native American firms again received 0.01 percent. Women-owned firms were utilized at 0.44 percent.

- In 1996, the City awarded non-M/WBEs 97.56 percent of the construction dollars for contracts in that calendar year. M/WBE utilization went down for the first time during the study period. Overall construction spending also experienced its first downturn of the five-year period. Construction spending was down over 34 percent from 1995.

Calendar Year 1997

- The last year of the study period was the third consecutive year that utilization of African American-owned firms increased. African American contractors obtained 0.16 percent of the construction dollars for 1997. Hispanic-owned companies received 1.58 percent, their lowest utilization since 1993. However, Asian and Native American firms saw a substantial increase in their receipts to 0.42 percent. Women-owned contractors were utilized at their highest rate since 1993, achieving 1.26 percent.

- The final year of the five-year period was the best for utilization of minority contractors. In none of the previous four years did the City's awards to M/WBE firms exceed 2.83 percent. In 1997, overall utilization of minority contractors was up to 3.41 percent of construction dollars for that year. Consequently, utilization of non-minority firms was at its lowest level of the study period at 96.59

percent. Overall construction spending was at its highest point during the study in 1997, totaling almost $420 million.

4.2.6 Subcontractor Availability

Exhibit 4-10 shows the estimated number of construction subcontractors available to conduct City work during the five-year study period. African American firms composed, on average, one percent of the companies available to perform work over the study period. Asian and Native American firms represented 3.53 percent of contractors available for construction procurement. Hispanic American companies were approximately 8.2 percent and women-owned firms were 26.67 percent of the available pool of contractors during the five-year study period. The largest individual group of contractors, comprising 60.61 percent of the total number of contractors for the study, was non-minority male-owned firms. All categories of M/WBE firms had steady increases in availability resulting in a corresponding decrease in the availability of non-M/WBE construction contractors.

Reviewing the availability of construction contractors in Exhibit 4-10 shows the following results:

- African American contracting firms increased in availability during the study period from 0.89 percent to 1.1 percent. African American-owned firms constituted the smallest category of available firms in Maricopa County.
- Hispanic-owned firms were the second largest M/WBE category in Maricopa County from 1993 through 1997. Hispanic contractors were 8.19 percent of the available pool of vendors.
- Asian and Native American-owned construction firms were available, on average, at a rate of 3.53 percent during the five years of the study period. These firms did not exceed five percent of available companies over the period of the study.

EXHIBIT 4-10
ESTIMATED AVAILABILITY OF CONSTRUCTION SUBCONTRACTORS IN MARICOPA COUNTY
BASED ON CENSUS DATA
FOR CALENDAR YEARS 1993 THROUGH 1997
CITY OF PHOENIX

ESTIMATED NUMBER OF AVAILABLE FIRMS											
YEAR	AFRICAN AMERICAN[1]		HISPANIC AMERICAN[1]		ASIAN & NATIVE AMERICAN[1]		NON-MINORITY WOMEN[2]		NON-MINORITY MEN[3]		TOTAL FIRMS[4]
	#	%	#	%	#	%	#	%	#	%	
1993	28	0.89%	243	7.76%	88	2.81%	709	22.65%	2,062	65.88%	3,130
1994	30	0.95%	253	7.99%	101	3.19%	782	24.69%	2,001	63.18%	3,167
1995	32	1.00%	262	8.18%	113	3.53%	854	26.65%	1,943	60.64%	3,204
1996	34	1.05%	272	8.39%	126	3.89%	927	28.60%	1,882	58.07%	3,241
1997	36	1.10%	282	8.60%	138	4.21%	1,000	30.51%	1,822	55.58%	3,278
AVG	32	1.00%	262	8.19%	113	3.53%	854	26.67%	1,942	60.61%	3,204

NOTE: Details may not sum to TOTAL FIRMS because of rounding.

SOURCES OF DATA: U.S. Bureau of the Census

- **Survey of Minority Owned Businesses (SMOBE) - 1987 & 1992 (African Americans, Hispanic Americans, Asian Americans, Native Americans and Other Minorities).**
- **Survey of Women Owned Businesses (SWOBE) - 1987 & 1992.**

[1] **Minority men and women firms are included in their respective minority classifications.**

[2] **The number of NON-MINORITY WOMEN construction firms was estimated by subtracting the number of minority women-owned construction firms from the census count of total women-owned construction firms. According to national statistics, African American women-owned construction firms comprise 6.28 percent of African American construction firms; Hispanic women-owned construction firms comprise 4.37 percent of Hispanic American construction firms; and other minority women-owned construction firms comprise 7.38 percent of other minority construction firms.**

[3] **Number of NON-MINORITY MEN firms derived by subtracting all M/WBE firms from TOTAL FIRMS.**

- Women-owned contractors were the largest M/WBE category, composing 26.67 percent of available firms for the study period. These firms increased from 22.7 percent in 1993 to 30.5 percent in 1997. In 1993, women-owned firms were less than one-quarter of available vendors; by 1997, they were almost one-third.

- Non-minority men were the largest category of available contractors even though their presence declined both in real numbers and as a percentage of the total for the study period. While the total number of firms available for construction work increased from 1993 to 1997, the number of non-M/WBE firms decreased during the same time.

4.2.7 Subcontractor Disparity

Exhibit 4-11 displays the disparity analysis for construction subcontractors. The disparity analysis compares utilization by percent of contract dollars paid in the first column and availability by percent of available firms in the second column. To determine the disparity index, multiply the ratio of utilization to availability by 100. An index of 100 indicates exact parity between utilization and availability. An index of less than 80 shows that there is "substantial disparity" and an index above 100 demonstrates overutilization.

The disparity analysis of construction subcontracts shows overutilization of non-minority male-owned firms and substantial underutilization of M/WBE firms in each of the five years included in the study.

Exhibit 4-11 shows:

- African American firms were available during the study period at a rate of one percent, and although utilization was 0.00 for the first two years of the study, utilization increased in each of the three subsequent years. However, the disparity index for African American contractors clearly indicates that those vendors were substantially underutilized.

- Hispanic construction firms were the most utilized minority contractors. Although 8.19 percent were available during the study period, utilization of Hispanic-owned businesses only once exceeded two percent and averaged 1.77 percent. The disparity index, while higher than any other M/WBE category, indicates a substantial level of disparity.

EXHIBIT 4-11
CONSTRUCTION SUBCONTRACTORS
DISPARITY ANALYSIS BY RACE, ETHNIC, AND GENDER CLASSIFICATION
USING CENSUS DATA
FOR CALENDAR YEARS 1993 THROUGH 1997
CITY OF PHOENIX

M/WBE CLASSIFICATION	% OF CONTRACT DOLLARS[1]	% OF AVAILABLE FIRMS[2]	DISPARITY INDEX[3]	DISPARATE IMPACT OF UTILIZATION[4]		SIGNIFICANCE OF PROPORTION[5]
CALENDAR YEAR 1993						
AFRICAN AMERICAN	0.00%	0.89%	0.00	* UNDERUTILIZATION		-0.50
HISPANIC	0.19%	7.76%	2.50	* UNDERUTILIZATION	*	-4.41
ASIAN & NATIVE AMERICAN	0.00%	2.81%	0.00	* UNDERUTILIZATION		-1.60
NON-MINORITY WOMEN	2.08%	22.65%	9.19	* UNDERUTILIZATION	*	-13.09
NON-MINORITY MEN	97.72%	65.88%	148.34	OVERUTILIZATION	*	30.50
CALENDAR YEAR 1994						
AFRICAN AMERICAN	0.00%	0.95%	0.00	* UNDERUTILIZATION		-0.54
HISPANIC	2.13%	7.99%	26.61	* UNDERUTILIZATION	*	-3.44
ASIAN & NATIVE AMERICAN	0.08%	3.19%	2.58	* UNDERUTILIZATION		-1.78
NON-MINORITY WOMEN	0.26%	24.69%	1.07	* UNDERUTILIZATION	*	-15.84
NON-MINORITY MEN	97.53%	63.18%	154.36	OVERUTILIZATION	*	31.85
CALENDAR YEAR 1995						
AFRICAN AMERICAN	0.01%	1.00%	1.05	* UNDERUTILIZATION		-0.56
HISPANIC	1.97%	8.18%	24.10	* UNDERUTILIZATION	*	-3.67
ASIAN & NATIVE AMERICAN	0.01%	3.53%	0.26	* UNDERUTILIZATION	*	-2.03
NON-MINORITY WOMEN	0.84%	26.65%	3.16	* UNDERUTILIZATION	*	-17.06
NON-MINORITY MEN	97.17%	60.64%	160.23	OVERUTILIZATION	*	32.95
CALENDAR YEAR 1996						
AFRICAN AMERICAN	0.13%	1.05%	11.94	* UNDERUTILIZATION		-0.53
HISPANIC	1.87%	8.39%	22.23	* UNDERUTILIZATION	*	-3.88
ASIAN & NATIVE AMERICAN	0.01%	3.89%	0.13	* UNDERUTILIZATION	*	-2.25
NON-MINORITY WOMEN	0.44%	28.60%	1.54	* UNDERUTILIZATION	*	-18.97
NON-MINORITY MEN	97.56%	58.07%	168.02	OVERUTILIZATION	*	34.72
CALENDAR YEAR 1997						
AFRICAN AMERICAN	0.16%	1.10%	14.13	* UNDERUTILIZATION		-0.54
HISPANIC	1.58%	8.60%	18.36	* UNDERUTILIZATION	*	-4.21
ASIAN & NATIVE AMERICAN	0.42%	4.21%	10.01	* UNDERUTILIZATION	*	-2.22
NON-MINORITY WOMEN	1.26%	30.51%	4.12	* UNDERUTILIZATION	*	-20.09
NON-MINORITY MEN	96.59%	55.58%	173.77	OVERUTILIZATION	*	35.22
SUMMARY						
AFRICAN AMERICAN	0.08%	1.00%	7.60	* UNDERUTILIZATION		-0.52
HISPANIC	1.77%	8.19%	21.67	* UNDERUTILIZATION	*	-3.79
ASIAN & NATIVE AMERICAN	0.15%	3.53%	4.33	* UNDERUTILIZATION		-1.95
NON-MINORITY WOMEN	0.86%	26.67%	3.22	* UNDERUTILIZATION	*	-17.06
NON-MINORITY MEN	97.14%	60.61%	160.26	OVERUTILIZATION	*	32.95

[1] Percent of construction contract dollars awarded to firms. See Exhibit 4-9.

[2] Percent of available firms. See Exhibit 4-10.

[3] The disparity index is the ratio of percentage utilization to percentage availability multiplied by 100.

[4] An asterisk (*) in front of UNDERUTILIZATION indicates a substantial level of disparity - index below 80.00.

[5] The significance of proportions test examines whether there is a statistical difference between utilization and availability. The test statistic is computed by taking the difference between utilization and availability and dividing by the square root of availability times one minus availability divided by the number of available firms. If the test statistic is greater than two standard deviations, overutilization is assumed. Conversely, if the test statistic is less than -2, underutilization is assumed. An asterisk is used to represent significant differences between utilization and availability at two standard deviations or more.

- Asian and Native American firms were utilized in every year of the study except one. However, their average utilization for the study period is only 0.15 percent, while availability is 3.53 percent. The disparity index for Asian and Native American firms indicates substantial disparity.

- Non-minority women had the largest pool of available vendors among M/WBE firms. Yet, the City awarded less than one percent of construction dollars to women-owned firms during the study period. The disparity index for women-owned firms indicates that this group had the most substantial underutilization between 1993 and 1997.

- Non-minority male-owned firms were the only contractors that had a disparity index over 100 during the study. This group was overutilized in every year of the study, and the disparity index indicates that in each year of the study, overutilization of non-M/WBE contractors increased from the previous year.

4.3 General Services

In this section, the market area, utilization, and availability of general services firms are analyzed. The disparity indices for general services firms follow.

4.3.1 Market Area

The overall market area for general services firms consisted of 99 counties in Arizona and other states. However, four of the counties captured over 75 percent of the dollars in this business category; thus, the relevant market area for general services is Maricopa County; Los Angeles, CA; Cook, IL; and Rock Island, IL; as shown in Exhibit 4-12.

4.3.2 Utilization Analysis

Exhibit 4-13 displays the utilization data for general services. General services spending increased during the study period. From 1994 to 1995, the City increased its spending by almost 200 percent. Calendar year 1996 saw an 81 percent increase. In the final year of the study, spending changed only slightly, increasing by less than six

EXHIBIT 4-12
MARKET AREA ANALYSIS
GENERAL SERVICES PROCUREMENT
FOR CALENDAR YEARS 1993 THROUGH 1997
CITY OF PHOENIX

COUNTY	# OF CONTRACTS	% OF CONTRACTS	# OF FIRMS	% OF FIRMS	DOLLARS	%OF DOLLARS	CUM% [1]
MARICOPA, AZ	56,399	74.48%	603	64.49%	$43,246,242.19	56.64%	56.64% [2]
LOS ANGELES, CA	5,958	7.87%	74	7.91%	$8,348,233.75	10.93%	67.57%
COOK, IL	1,344	1.77%	35	3.74%	$3,628,885.57	4.75%	72.33%
ROCK ISLAND, IL	260	0.34%	3	0.32%	$2,584,588.23	3.39%	75.71%
SALT LAKE, UT	251	0.33%	3	0.32%	$2,074,582.89	2.72%	78.43%
DALLAS, TX	2,719	3.59%	32	3.42%	$1,655,037.71	2.17%	80.60%
PIMA, AZ	817	1.08%	18	1.93%	$1,601,115.36	2.10%	82.69%
SAN FRANCISCO, CA	626	0.83%	7	0.75%	$1,424,502.20	1.87%	84.56%
FULTON, GA	268	0.35%	11	1.18%	$1,418,787.10	1.86%	86.42%
HARRIS, TX	451	0.60%	5	0.53%	$1,302,780.19	1.71%	88.12%
MECKLENBURG, NC	200	0.26%	5	0.53%	$1,171,279.24	1.53%	89.66%
HAMILTON, TN	445	0.59%	2	0.21%	$978,817.53	1.28%	90.94%
ST. LOUIS (CITY), MO	45	0.06%	4	0.43%	$623,315.00	0.82%	91.75%
NEW YORK, NY	80	0.11%	2	0.21%	$529,121.88	0.69%	92.45%
BRAZORIA, TX	93	0.12%	1	0.11%	$462,607.10	0.61%	93.05%
YAVAPAI, AZ	39	0.05%	1	0.11%	$456,362.47	0.60%	93.65%
PINAL, AZ	502	0.66%	4	0.43%	$455,533.01	0.60%	94.25%
FRANKLIN, OH	1,248	1.65%	3	0.32%	$347,952.28	0.46%	94.70%
SAN DIEGO, CA	280	0.37%	4	0.43%	$287,566.64	0.38%	95.08%
PHILADELPHIA, PA	98	0.13%	4	0.43%	$279,408.31	0.37%	95.45%
AUSTIN, TX	40	0.05%	1	0.11%	$247,818.11	0.32%	95.77%
ORANGE, CA	775	1.02%	7	0.75%	$218,426.76	0.29%	96.06%
BERNALILLO, NM	89	0.12%	1	0.11%	$208,279.75	0.27%	96.33%
HENRICO, VA	298	0.39%	1	0.11%	$198,566.29	0.26%	96.59%
HENNEPIN, MN	84	0.11%	4	0.43%	$195,554.50	0.26%	96.85%
MULTNOMAH, OR	30	0.04%	1	0.11%	$147,483.16	0.19%	97.04%
ESSEX, NJ	37	0.05%	3	0.32%	$138,162.56	0.18%	97.22%
QUEENS, NY	32	0.04%	1	0.11%	$132,420.41	0.17%	97.39%
KING, WA	12	0.02%	2	0.21%	$125,060.73	0.16%	97.56%
SUFFOLK, MA	21	0.03%	2	0.21%	$122,062.02	0.16%	97.72%
SAN MATEO, CA	142	0.19%	2	0.21%	$117,359.67	0.15%	97.87%
SPOKANE, WA	5	0.01%	1	0.11%	$103,781.64	0.14%	98.01%
KANE, IL	177	0.23%	3	0.32%	$87,407.27	0.11%	98.12%
JEFFERSON, AL	18	0.02%	1	0.11%	$84,319.67	0.11%	98.23%
MILWAUKEE, WI	3	0.00%	2	0.21%	$82,400.58	0.11%	98.34%
SANTA BARBARA, CA	7	0.01%	1	0.11%	$81,984.60	0.11%	98.45%
GRANT, WA	27	0.04%	1	0.11%	$76,068.09	0.10%	98.55%
HINDS, MS	62	0.08%	1	0.11%	$74,241.00	0.10%	98.64%
WESTCHESTER, NY	153	0.20%	3	0.32%	$59,923.78	0.08%	98.72%
VOLUSIA, FL	3	0.00%	1	0.11%	$55,440.00	0.07%	98.79%
STEVENS, WA	6	0.01%	1	0.11%	$53,995.52	0.07%	98.87%
BOULDER, CO	7	0.01%	1	0.11%	$50,273.80	0.07%	98.93%
ALLEGHENY, PA	54	0.07%	3	0.32%	$48,601.83	0.06%	98.99%
JO DAVIESS, IL	309	0.41%	1	0.11%	$48,363.88	0.06%	99.06%
CERRO GORDO, IA	15	0.02%	1	0.11%	$44,118.00	0.06%	99.12%
TUCKER, WV	65	0.09%	1	0.11%	$42,714.93	0.06%	99.17%
SEMINOLE, FL	70	0.09%	1	0.11%	$36,736.97	0.05%	99.22%
RICHMOND, GA	12	0.02%	1	0.11%	$36,067.44	0.05%	99.27%
WINNEBAGO, WI	9	0.01%	1	0.11%	$34,469.05	0.05%	99.31%
TARRANT, TX	11	0.01%	2	0.21%	$34,176.11	0.04%	99.36%

EXHIBIT 4-12 (Continued)
MARKET AREA ANALYSIS
GENERAL SERVICES PROCUREMENT
FOR CALENDAR YEARS 1993 THROUGH 1997
CITY OF PHOENIX

COUNTY	# OF CONTRACTS	% OF CONTRACTS	# OF FIRMS	% OF FIRMS	DOLLARS	%OF DOLLARS	CUM% [1]
CUYAHOGA, OH	116	0.15%	1	0.11%	$33,104.30	0.04%	99.40%
WAYNE, MI	110	0.15%	2	0.21%	$28,982.80	0.04%	99.44%
RAMSEY, MN	32	0.04%	1	0.11%	$23,576.42	0.03%	99.47%
STARK, OH	42	0.06%	1	0.11%	$23,432.00	0.03%	99.50%
SAINT LOUIS, MO	49	0.06%	1	0.11%	$22,597.94	0.03%	99.53%
BEAVER, PA	1	0.00%	1	0.11%	$21,534.00	0.03%	99.56%
LAKE, IL	28	0.04%	3	0.32%	$21,400.03	0.03%	99.59%
JACKSON, MO	4	0.01%	1	0.11%	$19,877.70	0.03%	99.61%
TULSA, OK	4	0.01%	2	0.21%	$19,680.64	0.03%	99.64%
PASSAIC, NJ	4	0.01%	1	0.11%	$18,720.00	0.02%	99.66%
WAUPACA, WI	17	0.02%	2	0.21%	$18,464.80	0.02%	99.69%
JEFFERSON, KY	5	0.01%	2	0.21%	$18,003.95	0.02%	99.71%
FAIRFIELD, CT	44	0.06%	2	0.21%	$16,911.64	0.02%	99.73%
DE KALB, GA	4	0.01%	1	0.11%	$16,780.50	0.02%	99.75%
DOUGLAS, NE	6	0.01%	1	0.11%	$15,846.13	0.02%	99.77%
LEWIS, WA	13	0.02%	1	0.11%	$15,238.52	0.02%	99.79%
OCEAN, NJ	16	0.02%	1	0.11%	$14,575.97	0.02%	99.81%
DUTCHESS, NY	7	0.01%	1	0.11%	$13,563.27	0.02%	99.83%
MIDDLESEX, MA	3	0.00%	1	0.11%	$12,675.00	0.02%	99.85%
HILLSBOROUGH, FL	27	0.04%	2	0.21%	$10,644.58	0.01%	99.86%
LUBBOCK, TX	3	0.00%	1	0.11%	$10,150.00	0.01%	99.88%
SHELBY, TN	272	0.36%	1	0.11%	$9,952.53	0.01%	99.89%
KINGS, NY	40	0.05%	1	0.11%	$9,107.85	0.01%	99.90%
DADE, FL	33	0.04%	1	0.11%	$8,978.07	0.01%	99.91%
NEW LONDON, CT	35	0.05%	1	0.11%	$8,401.83	0.01%	99.92%
POLK, IA	3	0.00%	2	0.21%	$6,643.50	0.01%	99.93%
HUNTERDON, NJ	1	0.00%	1	0.11%	$6,471.20	0.01%	99.94%
NEVADA, CA	4	0.01%	1	0.11%	$6,218.55	0.01%	99.95%
DUVAL, FL	4	0.01%	2	0.21%	$5,576.55	0.01%	99.96%
SUWANNEE, FL	12	0.02%	1	0.11%	$4,477.71	0.01%	99.96%
ALAMEDA, CA	1	0.00%	1	0.11%	$4,304.00	0.01%	99.97%
WASHOE, NV	2	0.00%	1	0.11%	$4,080.00	0.01%	99.97%
CHESTER, PA	1	0.00%	1	0.11%	$3,767.79	0.00%	99.98%
ERIE, NY	37	0.05%	2	0.21%	$3,752.71	0.00%	99.98%
VENTURA, CA	2	0.00%	2	0.21%	$2,187.50	0.00%	99.99%
BUCKS, PA	15	0.02%	1	0.11%	$1,525.45	0.00%	99.99%
LORAIN, OH	1	0.00%	1	0.11%	$1,435.00	0.00%	99.99%
OAKLAND, MI	2	0.00%	1	0.11%	$1,312.95	0.00%	99.99%
JOHNSON, KS	3	0.00%	2	0.21%	$1,158.06	0.00%	99.99%
POTTER, TX	1	0.00%	1	0.11%	$1,070.00	0.00%	99.99%
HAMILTON, IN	2	0.00%	1	0.11%	$1,048.12	0.00%	100.00%
BRONX, NY	13	0.02%	1	0.11%	$979.75	0.00%	100.00%
DENVER, CO	3	0.00%	1	0.11%	$710.15	0.00%	100.00%
MARATHON, WI	2	0.00%	1	0.11%	$708.85	0.00%	100.00%
WAUKESHA, WI	1	0.00%	1	0.11%	$357.10	0.00%	100.00%
MONTGOMERY, PA	1	0.00%	1	0.11%	$327.00	0.00%	100.00%
HURON, OH	1	0.00%	1	0.11%	$242.00	0.00%	100.00%
HAMILTON, OH	3	0.00%	1	0.11%	$217.50	0.00%	100.00%
HOWARD, MD	1	0.00%	1	0.11%	$16.00	0.00%	100.00%
TOTAL	**75,727**		**935**		**$76,353,784.68**		

SOURCE: City of Phoenix Engineering & Architectural Services, City Clerk's Archives, Materials Management

[1] Cumulative total of percentage of dollars in market area.

[2] Counties above the line are included in the relevant market area.

EXHIBIT 4-13
UTILIZATION OF GENERAL SERVICES CONTRACTORS
BY RACE, ETHNIC, AND GENDER CLASSIFICATION
FOR CALENDAR YEARS 1993 THROUGH 1997
CITY OF PHOENIX

CALENDAR YEAR	AFRICAN AMERICAN		HISPANIC AMERICAN		ASIAN & NATIVE AMERICAN		NON-MINORITY WOMEN		NON-MINORITY MEN		TOTAL FOR ALL CATEGORIES	TOTAL M/WBE
	$	%	$	%	$	%	$	%	$	%	$	%
1993	$0.00	0.00%	$0.00	0.00%	$0.00	0.00%	$0.00	0.00%	$566,689.03	100.00%	$566,689.03	0.00%
1994	$33,347.25	0.87%	$1,703.10	0.04%	$186,593.27	4.86%	$31,752.74	0.83%	$3,589,689.25	93.41%	$3,843,085.61	6.59%
1995	$229,877.75	2.01%	$27,038.84	0.24%	$284,825.05	2.49%	$412,858.35	3.60%	$10,502,917.45	91.67%	$11,457,517.44	8.33%
1996	$699,084.95	3.37%	$134,069.76	0.65%	$335,172.40	1.62%	$614,574.49	2.97%	$18,943,725.91	91.40%	$20,726,627.51	8.60%
1997	$514,998.09	2.34%	$277,394.33	1.26%	$356,241.25	1.62%	$1,529,381.79	6.96%	$19,290,791.09	87.81%	$21,968,806.55	12.19%
TOTAL	$1,477,308.04	2.52%	$440,206.03	0.75%	$1,162,831.97	1.99%	$2,588,567.37	4.42%	$52,893,812.73	90.32%	$58,562,726.14	9.68%

SOURCE: City of Phoenix Finance Department

percent. In 1997, spending on general services was 5.7 times the spending in 1994. The number of general services purchases increased substantially over the study period approximately corresponding to the increase in spending.

Non-minority male-owned firms received 90.3 percent of all dollars paid to general services contractors over the five-year study period. M/WBE firms were awarded almost 9.7 percent of City dollars for general services.

Overall, African American firms received 2.52 percent of the total dollars; Hispanic-owned firms received 0.75 percent of the total dollars; Asian and Native American firms collected two percent; and non-minority women-owned firms received 4.42 percent of the total dollars for general services contracting over the study period.

Findings for each of the five years of the study reveal:

- In 1993, there was no utilization of M/WBE general services providers. The only category of general services providers to receive any of the City's dollars were non-M/WBEs. It is important to note that the City's current M/WBE program took effect in the last two months of 1993.

- In 1994, African American firms were utilized for 0.87 percent of the City's general services needs; Hispanic-owned firms performed 0.04 percent of the work; Asian and Native American firms were utilized at almost five percent. Non-minority women were awarded 0.83 percent of contract dollars, and non-minority men were awarded 93.41 percent.

- For 1995, utilization of African American firms increased for the second consecutive year to two percent of contract dollars. Hispanic utilization was at 0.24 percent, as Asian and Native American utilization decreased to 2.49 percent. Women-owned firms received 3.6 percent of contract dollars and non-minority male-owned companies received 91.67 percent during calendar year 1995.

- For the third consecutive year, utilization of African American firms increased. Utilization of Hispanic firms also increased from 0.24 in 1995 to 0.65 percent in 1996. Asian and Native American firms received 1.62 percent of contract dollars in 1996, while white female firms were awarded almost three percent of 1996 dollars. Non-minority male-owned firms captured 91.40 percent of the general services dollars for 1996.

- In the last year of the study, African American firms collected 2.34 percent of the general services dollars for the City. Hispanic firms

also saw their highest utilization during the study period, 1.26 percent. Asian and Native American firms received 1.62 percent of the dollars for the second consecutive year, and women-owned firms were awarded nearly seven percent of the dollars. Non-minority male-owned firms again captured their lowest total during the study period, 87.81 percent.

4.3.3 Availability Analysis

Exhibit 4-14 presents the estimated availability of general services firms to conduct work for the City during the five-year study period. The availability of all M/WBEs decreased during the period and the availability of non-M/WBEs increased. The average availability of non-minority male-owned firms over the study period was 57.51 percent of the total firms. Non-minority women-owned firms over the same period constituted 31.8 percent. Hispanic firms comprised 5.22 percent; Asian and Native American firms represented 4.29 percent; and African American firms represented 1.18 percent of the available firms from 1993 through 1997.

The availability table, Exhibit 4-14, shows:

- All M/WBE categories decreased in availability from 1993 through 1997. Although some groups of firms experienced growth in real numbers, their availability decreased relative to the total number of available firms.

4.3.4 Disparity Analysis

Exhibit 4-15 details the disparity analysis for general services firms. This chart compares utilization by the percent of contract dollars paid in the first column and availability by the percent of available firms in the second column. The disparity index in the third column reflects the ratio of these two numbers multiplied by 100. An index of 100 indicates parity between utilization and availability. An index of less than 80 shows

EXHIBIT 4-14
ESTIMATED AVAILABILITY OF GENERAL SERVICES FIRMS BY RACE, ETHNIC AND GENDER CLASSIFICATION USING CENSUS DATA FOR CALENDAR YEARS 1993 THROUGH 1997 CITY OF PHOENIX

YEAR	AFRICAN AMERICAN[1]		HISPANIC AMERICAN[1]		ASIAN & NATIVE AMERICAN[1]		NON-MINORITY WOMEN[2]		NON-MINORITY MEN[3]		TOTAL FIRMS[4]
	#	%	#	%	#	%	#	%	#	%	
1993	90	1.58%	349	6.13%	257	4.51%	1,841	32.33%	3,157	55.44%	5,694
1994	83	1.37%	343	5.65%	267	4.40%	1,947	32.05%	3,434	56.54%	6,074
1995	76	1.18%	337	5.22%	277	4.29%	2,052	31.79%	3,712	57.51%	6,454
1996	70	1.02%	331	4.84%	287	4.20%	2,158	31.57%	3,989	58.36%	6,835
1997	63	0.87%	325	4.50%	297	4.12%	2,263	31.37%	4,267	59.14%	7,215
AVG	76	1.18%	337	5.22%	277	4.29%	2,052	31.80%	3,712	57.51%	6,454

NOTE: Details may not sum to TOTAL FIRMS because of rounding.

SOURCES OF DATA: U.S. Bureau of the Census

- **Survey of Minority Owned Businesses (SMOBE) - 1987 & 1992 (African Americans, Hispanic Americans, Asian Americans, Native Americans and Other Minorities).**
- **Survey of Women Owned Businesses (SWOBE) - 1987 & 1992.**

[1] **Minority men and women firms are included in their respective minority classifications.**

[2] **The number of NON-MINORITY WOMEN general services firms was estimated by subtracting the number of minority women-owned general services firms from the census count of total women-owned general services firms. According to national statistics, African American women-owned general services firms comprise 6.28 percent of African American general services firms; Hispanic women-owned general services firms comprise 4.37 percent of Hispanic American general services firms; and other minority women-owned general services firms comprise 7.38 percent of other minority general services firms.**

[3] **Number of WHITE MEN firms derived by subtracting all M/WBE firms from TOTAL FIRMS.**

[4] **TOTAL FIRMS derived from the U.S. Bureau of Census and County Business Patterns.**

EXHIBIT 4-15
GENERAL SERVICES FIRMS
DISPARITY ANALYSIS BY RACE, ETHNIC, AND GENDER CLASSIFICATION
USING CENSUS DATA
FOR CALENDAR YEARS 1993 THROUGH 1997
CITY OF PHOENIX

M/WBE CLASSIFICATION	% OF CONTRACT DOLLARS[1]	% OF AVAILABLE FIRMS[2]	DISPARITY INDEX[3]	DISPARATE IMPACT OF UTILIZATION[4]	SIGNIFICANCE OF PROPORTION[5]
CALENDAR YEAR 1993					
AFRICAN AMERICAN	0.00%	1.58%	0.00	* UNDERUTILIZATION	-1.20
HISPANIC	0.00%	6.13%	0.00	* UNDERUTILIZATION	* -4.77
ASIAN & NATIVE AMERICAN	0.00%	4.51%	0.00	* UNDERUTILIZATION	* -3.49
NON-MINORITY WOMEN	0.00%	32.33%	0.00	* UNDERUTILIZATION	* -29.66
NON-MINORITY MEN	100.00%	55.44%	180.36	OVERUTILIZATION	* 50.37
CALENDAR YEAR 1994					
AFRICAN AMERICAN	0.87%	1.37%	63.50	* UNDERUTILIZATION	-0.39
HISPANIC	0.04%	5.65%	0.78	* UNDERUTILIZATION	* -4.50
ASIAN & NATIVE AMERICAN	4.86%	4.40%	110.45	OVERUTILIZATION	0.37
NON-MINORITY WOMEN	0.83%	32.05%	2.58	* UNDERUTILIZATION	* -29.53
NON-MINORITY MEN	93.41%	56.54%	165.22	OVERUTILIZATION	* 43.59
CALENDAR YEAR 1995					
AFRICAN AMERICAN	2.01%	1.18%	170.38	OVERUTILIZATION	0.67
HISPANIC	0.24%	5.22%	4.52	* UNDERUTILIZATION	* -4.11
ASIAN & NATIVE AMERICAN	2.49%	4.29%	57.92	* UNDERUTILIZATION	-1.48
NON-MINORITY WOMEN	3.60%	31.79%	0.73	* UNDERUTILIZATION	* -27.42
NON-MINORITY MEN	91.67%	57.51%	159.38	OVERUTILIZATION	* 42.10
CALENDAR YEAR 1996					
AFRICAN AMERICAN	3.37%	1.02%	329.34	OVERUTILIZATION	1.95
HISPANIC	0.65%	4.84%	13.36	* UNDERUTILIZATION	* -3.56
ASIAN & NATIVE AMERICAN	1.62%	4.20%	38.51	* UNDERUTILIZATION	* -2.18
NON-MINORITY WOMEN	2.97%	31.57%	9.39	* UNDERUTILIZATION	* -28.59
NON-MINORITY MEN	91.40%	58.36%	156.61	OVERUTILIZATION	* 42.33
CALENDAR YEAR 1997					
AFRICAN AMERICAN	2.34%	0.87%	229.77	OVERUTILIZATION	1.26
HISPANIC	1.26%	4.50%	5.24	* UNDERUTILIZATION	* -2.82
ASIAN & NATIVE AMERICAN	1.62%	4.12%	60.39	* UNDERUTILIZATION	* -2.16
NON-MINORITY WOMEN	6.96%	31.37%	11.49	* UNDERUTILIZATION	* -25.02
NON-MINORITY MEN	87.81%	59.14%	155.00	OVERUTILIZATION	* 38.10
SUMMARY					
AFRICAN AMERICAN	2.52%	1.18%	213.11	OVERUTILIZATION	1.08
HISPANIC	0.75%	5.22%	14.40	* UNDERUTILIZATION	* -3.69
ASIAN & NATIVE AMERICAN	1.99%	4.29%	46.27	* UNDERUTILIZATION	-1.89
NON-MINORITY WOMEN	4.42%	31.80%	13.90	* UNDERUTILIZATION	* -26.63
NON-MINORITY MEN	90.32%	57.51%	157.06	OVERUTILIZATION	* 40.44

[1] Percent of general service contract dollars awarded to firms. See Exhibit 4-13

[2] Percent of available firms. See Exhibit 4-14

[3] The disparity index is the ratio of percentage utilization to percentage availability times 100.

[4] An asterisk (*) in front of UNDERUTILIZATION indicates a substantial level of disparity - index below 80.00.

[5] The significance of proportions test examines if there is a statistical difference between utilization and availability. The test statistic is computed by taking the difference between utilization and availability and dividing by the square root of availability times one minus availability divided by the available firms. If the test statistic is greater than two standard deviations, overutilization is assumed. Conversely, if the test statistic is less than -2, underutilization is assumed. An asterisk is used to represent significant differences between utilization and availability at two standard deviations or more.

"substantial disparity" and an index above 100 demonstrates overutilization. Overall, the disparity analysis of general services firms indicates overutilization of non-minority male-owned firms and substantial underutilization of all M/WBE groups in all years of the study.

The disparity analysis of general services follows:

- African American-owned general services contractors represented an average of 1.18 percent of the available firms during the study period, yet they were awarded 2.52 percent of the general services dollars by the City. Two characteristics are prominent, however, in the disparity analysis. African American utilization increased in every year of the study except 1997, and the disparity index indicates a move toward parity from 1993 to 1994 and overutilization from 1995 to 1997. Although, African American general services providers were overutilized, there was not a statistically significant difference between utilization and availability.

- Hispanic American firms comprised 5.22 percent of the relevant market area's firms for general services contracting. However, the City utilized Hispanic firms at a rate of 0.75 percent. The disparity index for Hispanic firms was 14.4 for the study period, indicating that the City substantially underutilized Hispanic-owned businesses from 1993 through 1997.

- Asian and Native American firms were available at a rate of 4.29 percent during the study period. The City, however, only awarded two percent of the general services dollars to Asian and Native American firms during the relevant period. Although there was almost parity in 1994, no other year did Asian and Native American firms have a disparity index over 61. During the entire five-year study, Asian and Native American firms were awarded only three contracts, and they were substantially underutilized over the course of the study.

- Women-owned businesses providing general services were available at a rate of 31.8 percent during the study period. The utilization of non-minority women-owned firms was 4.42 percent. The City's utilization of non-minority women resulted in a disparity index of 13.9, making non-minority women the most underutilized minority category during the study.

Of all the M/WBE firms available to the City for general services, African American firms fared best. The other M/WBE categories were severely underutilized relative to their availability within the relevant market area. The availability of non-minority male-

owned firms rose over the study period and their disparity indices declined proportionately from year to year.

4.4 Commodities

This section analyzes the City's commodity procurement dollar awards. MGT first determined the market area, the utilization and availability of commodity vendors, and then calculated disparity results.

4.4.1 Market Area

The relevant market area for commodity purchases consists only of Maricopa County since over 75 percent of the dollars spent by the City for commodities went to firms located in Maricopa County. Exhibit 4-16 shows the breakdown of the City's commodity purchases by county and state. Firms located in Maricopa County received 75.31 percent of the City's business. Appendix B contains a complete market area chart for commodity purchases.

4.4.2 Utilization Analysis

Exhibit 4-17 presents the utilization of commodity vendors within the relevant market area. The City's expenditures on commodities over the five-year study period increased after the first year and remained fairly constant in later years. The total increase from 1993 to 1997 was approximately 55 percent; however, most of that increase occurred after the first year of the study period. M/WBEs were utilized at less than three percent.

Exhibit 4-18 shows the utilization of Bottomline Enterprises, Inc. in the City's purchasing of commodities.

EXHIBIT 4-16
COMMODITIES
MARKET AREA ANALYSIS
FOR CALENDAR YEARS 1993 THROUGH 1997
CITY OF PHOENIX

COUNTY	# OF PURCHASES	% OF P.O.s	# OF VENDORS	% OF VENDORS	DOLLARS	% OF DOLLARS	CUM% [1]	
MARICOPA, AZ	**336,860**	**70.49%**	**16,029**	**63.94%**	**$ 1,062,801,624.80**	**75.31%**	**75.31%**	
LOS ANGELES, CA	21,450	4.49%	770	3.07%	$ 74,779,251.61	5.30%	80.61%	[2]
COOK, IL	27,648	5.79%	544	2.17%	$ 40,636,821.33	2.88%	83.49%	
DALLAS, TX	9,713	2.03%	337	1.34%	$ 25,375,545.32	1.80%	85.29%	
SAN FRANCISCO, CA	5,785	1.21%	134	0.53%	$ 20,975,518.01	1.49%	86.77%	
FULTON, GA	1,882	0.39%	117	0.47%	$ 11,150,330.01	0.79%	87.56%	
ORANGE, CA	2,879	0.60%	202	0.81%	$ 9,531,366.66	0.68%	88.24%	
SAN MATEO, CA	514	0.11%	74	0.30%	$ 7,348,755.23	0.52%	88.76%	
PIMA, AZ	4,254	0.89%	250	1.00%	$ 7,018,436.79	0.50%	89.26%	
MILWAUKEE, WI	1,559	0.33%	64	0.26%	$ 5,830,059.68	0.41%	89.67%	
HAMILTON, TN	697	0.15%	5	0.02%	$ 5,246,232.89	0.37%	90.04%	
SALT LAKE, UT	5,471	1.14%	91	0.36%	$ 5,202,712.24	0.37%	90.41%	
HENNEPIN, MN	3,310	0.69%	107	0.43%	$ 5,146,241.56	0.36%	90.78%	
MECKLENBURG, NC	1,294	0.27%	65	0.26%	$ 5,085,540.30	0.36%	91.14%	
RIVERSIDE, CA	161	0.03%	44	0.18%	$ 4,650,133.11	0.33%	91.46%	
WASHOE, NV	1,794	0.38%	15	0.06%	$ 4,614,188.35	0.33%	91.79%	
HARRIS, TX	2,950	0.62%	92	0.37%	$ 4,337,258.26	0.31%	92.10%	
SAN DIEGO, CA	2,806	0.59%	186	0.74%	$ 3,847,825.69	0.27%	92.37%	
SAINT LOUIS, MO	393	0.08%	38	0.15%	$ 3,767,049.62	0.27%	92.64%	
WASHINGTON, DC	878	0.18%	267	1.07%	$ 3,423,606.77	0.24%	92.88%	
NEW YORK, NY	1,070	0.22%	181	0.72%	$ 3,334,748.96	0.24%	93.12%	
DENVER, CO	2,155	0.45%	95	0.38%	$ 3,090,258.05	0.22%	93.34%	
SUFFOLK, MA	767	0.16%	83	0.33%	$ 2,910,214.63	0.21%	93.54%	
FAIRFAX, VA	297	0.06%	68	0.27%	$ 2,816,909.81	0.20%	93.74%	
MIDDLESEX, MA	546	0.11%	102	0.41%	$ 2,799,714.27	0.20%	93.94%	
EL PASO, CO	166	0.03%	27	0.11%	$ 2,722,727.45	0.19%	94.13%	
ONONDAGA, NY	114	0.02%	14	0.06%	$ 2,670,696.94	0.19%	94.32%	
SAN BERNARDINO, CA	646	0.14%	51	0.20%	$ 2,426,830.47	0.17%	94.50%	
ESSEX, NJ	525	0.11%	66	0.26%	$ 2,404,324.51	0.17%	94.67%	
KING, WA	2,111	0.44%	132	0.53%	$ 2,359,059.82	0.17%	94.83%	
ALAMEDA, CA	422	0.09%	86	0.34%	$ 2,162,943.01	0.15%	94.99%	
SANTA CLARA, CA	537	0.11%	120	0.48%	$ 2,130,924.24	0.15%	95.14%	
SACRAMENTO, CA	150	0.03%	51	0.20%	$ 2,115,600.17	0.15%	95.29%	
BERNALILLO, NM	632	0.13%	43	0.17%	$ 2,087,812.53	0.15%	95.43%	
SAINT LOUIS CITY (CITY), MO	696	0.15%	56	0.22%	$ 2,055,834.74	0.15%	95.58%	
SHELBY, TN	3,282	0.69%	14	0.06%	$ 1,980,686.90	0.14%	95.72%	
ALL OTHER COUNTIES	31,478	6.59%	4,450	17.75%	$ 60,389,142.45	4.28%	100.00%	
TOTAL	477,892	100.00%	25,070	100.00%	$ 1,411,226,927.18	100.00%		

SOURCE: City of Phoenix Materials Management Department

[1]Cumulative total of percentage of dollars in market area.
[2]Counties above the line are included in the relevant market area.

EXHIBIT 4-17
UTILIZATION OF COMMODITIES VENDORS
BY RACE, ETHNIC AND GENDER CLASSIFICATION
FOR CALENDAR YEARS 1993 THROUGH 1997
CITY OF PHOENIX

CALENDAR YEAR	AFRICAN AMERICAN		HISPANIC AMERICAN		ASIAN & NATIVE AMERICAN		NON-MINORITY WOMEN		NON-MINORITY MEN		TOTAL FOR ALL CATEGORIES	TOTAL M/WBE
	$	%	$	%	$	%	$	%	$	%	$	%
1993	$286,828.00	0.20%	$85,074.00	0.06%	$426,929.00	0.30%	$271,220.00	0.19%	$139,959,901.00	99.24%	$141,029,952.00	0.76%
1994	$893,868.20	0.33%	$794,720.54	0.30%	$1,613,614.81	0.60%	$574,715.23	0.21%	$264,239,082.52	98.55%	$268,116,001.30	1.45%
1995	$1,922,706.65	0.92%	$1,384,995.78	0.66%	$3,307,332.64	1.59%	$652,010.78	0.31%	$201,004,053.41	96.51%	$208,271,099.26	3.49%
1996	$1,632,488.23	0.72%	$2,665,712.65	1.17%	$2,071,840.09	0.91%	$770,158.99	0.34%	$220,225,107.22	96.86%	$227,365,307.18	3.14%
1997	$1,608,857.08	0.74%	$1,574,389.61	0.72%	$2,178,040.17	1.00%	$1,480,592.65	0.68%	$211,160,900.56	96.86%	$218,002,780.07	3.14%
TOTAL	$6,344,748.16	0.60%	$6,504,892.58	0.61%	$9,597,756.71	0.90%	$3,748,697.65	0.35%	$1,036,589,044.71	97.54%	$1,062,785,139.81	2.46%

Source: City of Phoenix Finance Department.

EXHIBIT 4-18
COMMODITY PURCHASES
UTILIZING BOTTOMLINE ENTERPRISES INC
CITY OF PHOENIX

YEAR	DOLLAR AMOUNT TO BOTTOMLINE	DOLLAR AMOUNT TO ALL AFRICAN AMERICAN FIRMS	BOTTOMLINE'S SHARE OF AFRICAN AMERICAN UTILIZATION
1994	$857,323.50	$893,868.20	95.91%
1995	$1,555,913.19	$1,922,706.65	80.92%
1996	$1,401,383.78	$1,632,488.23	85.84%
1997	$1,311,070.00	$1,608,857.08	81.49%
TOTAL	**$5,125,690.47**	**$6,057,920.16**	**84.61%**

Source: City of Phoenix Finance Department.

As Exhibit 4-18 shows, of the six million dollars the City spent with African American firms, over five million was spent with one company. Bottomline Enterprises collected 84 percent of the dollars the City spent with African American commodity vendors.

During the study period, no minority category had an average utilization over one percent. The highest rate of utilization was for Asian and Native American firms at 0.90 percent for the five years. The next highest utilization rate was for Hispanic American firms, although the rate for African American firms was close. Utilization rates for these two groups were 0.61 percent and 0.60 percent, respectively. Total M/WBE utilization did not exceed 3.5 percent in the relevant market area for any of the years of the study.

Exhibit 4-19 showing utilization of vendors for commodity purchases demonstrates:

- Every ethnic/gender classification had some utilization for each year of the study. African American firms had an increase in utilization for two years and then utilization began to taper. The highest utilization of African American vendors was in 1995, with those firms receiving just under one percent of the commodities dollars.

- Hispanic American firms had a consistent rise in utilization through 1996, but they received only 0.61 percent of the total dollars during the study period. Their highest rate was in 1996 when they captured 1.17 percent of the commodities expenditures for that year.

EXHIBIT 4-19
ESTIMATED AVAILABILITY OF COMMODITIES VENDORS IN MARKET AREA
BASED ON CENSUS DATA
FOR CALENDAR YEARS 1993 THROUGH 1997
CITY OF PHOENIX

ESTIMATED NUMBER OF AVAILABLE FIRMS											
YEAR	AFRICAN AMERICAN[1]		HISPANIC AMERICAN[1]		ASIAN & NATIVE AMERICAN		NON-MINORITY WOMEN[2]		NON-MINORITY MEN[3]		TOTAL FIRMS[4]
	#	%	#	%	#	%	#	%	#	%	
1993	20	0.69%	83	2.88%	93	3.22%	896	31.05%	1,794	62.16%	2886
1994	23	0.74%	92	2.94%	104	3.33%	975	31.21%	1,930	61.78%	3124
1995	25	0.74%	102	3.03%	116	3.45%	1054	31.35%	2,065	61.42%	3362
1996	28	0.78%	111	3.08%	127	3.53%	1133	31.47%	2,201	61.14%	3600
1997	30	0.78%	121	3.15%	138	3.60%	1213	31.61%	2,336	60.87%	3838
AVG	25	0.75%	102	3.03%	116	3.44%	1054	31.36%	2,065	61.43%	3362

NOTE: Details may not sum to TOTAL FIRMS because of rounding.

SOURCES OF DATA: U.S. Bureau of the Census
- **Survey of Minority Owned Businesses (SMOBE) - 1987 & 1992 (African Americans, Hispanic Americans, Asian Americans, Native Americans and Other Minorities).**
- **Survey of Women Owned Businesses (SWOBE) - 1987 & 1992.**

[1] **Minority men and women firms are included in their respective minority classifications.**

[2] **The number of NON-MINORITY WOMEN construction firms was estimated by subtracting the number of minority women-owned construction firms from the census count of total women-owned construction firms. According to national statistics, African American women-owned construction firms comprise 6.28 percent of African American construction firms; Hispanic women-owned construction firms comprise 4.37 percent of Hispanic American construction firms; and other minority women-owned construction firms comprise 7.38 percent of other minority construction firms.**

[3] **Number of WHITE MEN firms derived by subtracting all M/WBE firms from TOTAL FIRMS.**

[4] **TOTAL FIRMS derived from the U.S. Bureau of Census and County Business Patterns.**

- Utilization of Asian and Native American firms increased over the study period as well. The 1.59 percent of the dollars that these firms received in 1995 represented the highest utilization of any M/WBE category in any year of the study. Commodities vendors owned by Asian and Native Americans were utilized 0.90 percent of the time. That rate is the highest overall utilization of any of the categories.

- Non-minority women were the least utilized group. Non-minority women only captured 0.35 percent of the commodities dollars from the City during the study period. However, utilization of women-owned firms did increase in every year of the study with the final year yielding a utilization of 0.68 percent.

4.4.3 Availability Analysis

Exhibit 4-19 shows the estimated availability of commodities firms within the relevant market area. On average, non-minority male-owned firms represented 61.43 percent of the available firms while M/WBEs accounted for the other 38.57 percent. Although the total number of available firms increased over the study period, the representation of minority firms in the market exceeded the pace of overall growth and minority firms became a larger percentage of total firms.

- The availability of African American firms increased during the study period. African American firms increased from 0.69 percent of available firms to 0.78 percent. In terms of the actual number of firms, African American-owned firms increased 50 percent from 1993 to 1997. Hispanic firms increased in availability from 2.88 percent to 3.15 percent in Maricopa County. The number of Hispanic firms increased from 83 in 1993, to 121 in 1997, a 46 percent increase.

- Asian and Native American commodities firms also saw a rise in their numbers during the five-year study period. The 138 firms in 1997 represented a 48 percent increase in the number of available firms from 1993's number. The number of non-minority women-owned firms increased slightly during the study period. The estimated number of women-owned firms rose 35 percent between 1993 and 1997, while non-M/WBEs fell from availability of 62.16 percent to 60.87 percent. The growth rate in the number of non-minority male-owned companies did not keep pace with the overall growth rate in the total number of available vendors from 1993 to 1997.

4.4.4 Disparity Analysis

Exhibit 4-20 illustrates the disparity analysis for commodities. This exhibit compares utilization by the percent of contract dollars paid in the first column and availability by the percent of available firms in the second column. The disparity index in the third column reflects the ratio of these two numbers multiplied by 100.

An index of 100 indicates parity between utilization and availability. An index of less than 80 shows "substantial disparity" and an index above 100 demonstrates overutilization. Overall, the disparity analysis of commodities firms indicates overutilization of non-minority male-owned firms and African American firms but substantial underutilization of all other M/WBE group in all years of the study.

The disparity analysis of commodities shows:

- African American-owned commodities vendors represented an average of 0.75 percent of the available firms during the study period, but they were awarded 0.60 percent of commodity dollars by the City. Again, most of the dollars, 84 percent, spent on African American commodity vendors went to one firm.

- Hispanic American firms represented slightly over three percent of the relevant market area's commodity firms. However, the City utilized Hispanic firms for only 0.61 percent of commodity dollars. The disparity index for Hispanic firms was 20.21 for the study period. The disparity index shows that the City substantially underutilized Hispanic-owned businesses from 1993 through 1997.

- Asian and Native American firms were available at a rate of 3.44 percent during the study period. The City, however, only awarded 0.90 percent of the commodities dollars to Asian and Native American firms during the study period. During the entire five-year period of the study, these firms were substantially underutilized.

- Women-owned commodity vendors were available at a rate of 31.36 percent during the study period. The utilization of non-minority women-owned firms was a mere 0.35 percent. The City's utilization of firms in this group resulted in a disparity index of only 1.12. This group of M/WBEs was the most underutilized during the study period.

EXHIBIT 4-20
COMMODITIES VENDORS
DISPARITY ANALYSIS BY RACE, ETHNIC, AND GENDER CLASSIFICATION
USING CENSUS DATA
FOR CALENDAR YEARS 1993 THROUGH 1997
CITY OF PHOENIX

M/WBE CLASSIFICATION	% OF CONTRACT DOLLARS[1]	% OF AVAILABLE FIRMS[2]	DISPARITY INDEX[3]	DISPARATE IMPACT OF UTILIZATION[4]	SIGNIFICANCE OF PROPORTION[5]
CALENDAR YEAR 1993					
AFRICAN AMERICAN	0.20%	0.69%	29.35	* UNDERUTILIZATION	-0.26
HISPANIC	0.06%	2.88%	2.10	* UNDERUTILIZATION	-1.53
ASIAN & NATIVE AMERICAN	0.30%	3.22%	9.39	* UNDERUTILIZATION	-1.59
NON-MINORITY WOMEN	0.19%	31.05%	0.62	* UNDERUTILIZATION	* -19.96
NON-MINORITY MEN	99.24%	62.16%	159.65	OVERUTILIZATION	* 32.38
CALENDAR YEAR 1994					
AFRICAN AMERICAN	0.33%	0.74%	45.28	* UNDERUTILIZATION	-0.23
HISPANIC	0.30%	2.94%	10.07	* UNDERUTILIZATION	-1.50
ASIAN & NATIVE AMERICAN	0.60%	3.33%	18.08	* UNDERUTILIZATION	-1.55
NON-MINORITY WOMEN	0.21%	31.21%	0.69	* UNDERUTILIZATION	* -20.89
NON-MINORITY MEN	98.55%	61.78%	159.52	OVERUTILIZATION	* 33.25
CALENDAR YEAR 1995					
AFRICAN AMERICAN	0.92%	0.74%	124.15	OVERUTILIZATION	0.10
HISPANIC	0.66%	3.03%	21.92	* UNDERUTILIZATION	-1.39
ASIAN & NATIVE AMERICAN	1.59%	3.45%	46.02	* UNDERUTILIZATION	-1.10
NON-MINORITY WOMEN	0.31%	31.35%	1.00	* UNDERUTILIZATION	* -21.72
NON-MINORITY MEN	96.51%	61.42%	157.13	OVERUTILIZATION	* 32.76
CALENDAR YEAR 1996					
AFRICAN AMERICAN	0.72%	0.78%	92.31	UNDERUTILIZATION	-0.04
HISPANIC	1.17%	3.08%	38.02	* UNDERUTILIZATION	-1.16
ASIAN & NATIVE AMERICAN	0.91%	3.53%	25.83	* UNDERUTILIZATION	-1.60
NON-MINORITY WOMEN	0.34%	31.47%	1.08	* UNDERUTILIZATION	* -22.57
NON-MINORITY MEN	96.86%	61.14%	158.43	OVERUTILIZATION	* 34.38
CALENDAR YEAR 1997					
AFRICAN AMERICAN	0.74%	0.78%	94.41	UNDERUTILIZATION	-0.03
HISPANIC	0.72%	3.15%	22.91	* UNDERUTILIZATION	-1.53
ASIAN & NATIVE AMERICAN	1.00%	3.60%	27.79	* UNDERUTILIZATION	-1.64
NON-MINORITY WOMEN	0.68%	31.61%	2.15	* UNDERUTILIZATION	* -23.17
NON-MINORITY MEN	96.86%	60.87%	159.14	OVERUTILIZATION	* 35.65
SUMMARY					
AFRICAN AMERICAN	0.60%	0.75%	79.65	* UNDERUTILIZATION	-0.09
HISPANIC	0.61%	3.03%	20.21	* UNDERUTILIZATION	-1.42
ASIAN & NATIVE AMERICAN	0.90%	3.44%	26.26	* UNDERUTILIZATION	-1.50
NON-MINORITY WOMEN	0.35%	31.36%	1.12	* UNDERUTILIZATION	* -21.70
NON-MINORITY MEN	97.54%	61.43%	158.78	OVERUTILIZATION	* 33.71

[1] Percent of commodity procurement dollars awarded to firms. See Exhibit 4-17

[2] Percent of available firms. See Exhibit 4-19.

[3] The disparity index is the ratio of percentage utilization to percentage availability multiplied by 100.

[4] An asterisk (*) in front of UNDERUTILIZATION indicates a substantial level of disparity - index below 80.00.

[5] The significance of proportions test examines whether there is a statistical difference between utilization and availability. The test statistics is computed by taking the difference between utilization and availability and dividing by the square root of availability times one minus availability divided by the available firms. If the test statistic is greater than two standard deviations, overutilization is assumed. Conversely, if the test statistic is less than -2, underutilization is assumed. An asterisk is used to represent significant differences between utilization and availability at two standard deviations or more.

Of all the M/WBE firms available to the City for commodities, African American firms fared the best, as their disparity index was 79.65. The other M/WBE categories were severely underutilized relative to their availability within the relevant market area. Overall utilization of minority firms relative to their availability in the relevant market area was still quite low despite gradual improvement over the study period.